

NEWFOUNDLAND BIRDS: EXPLOITATION, STUDY, CONSERVATION

WILLIAM A. MONTEVECCHI

and

LESLIE M. TUCK



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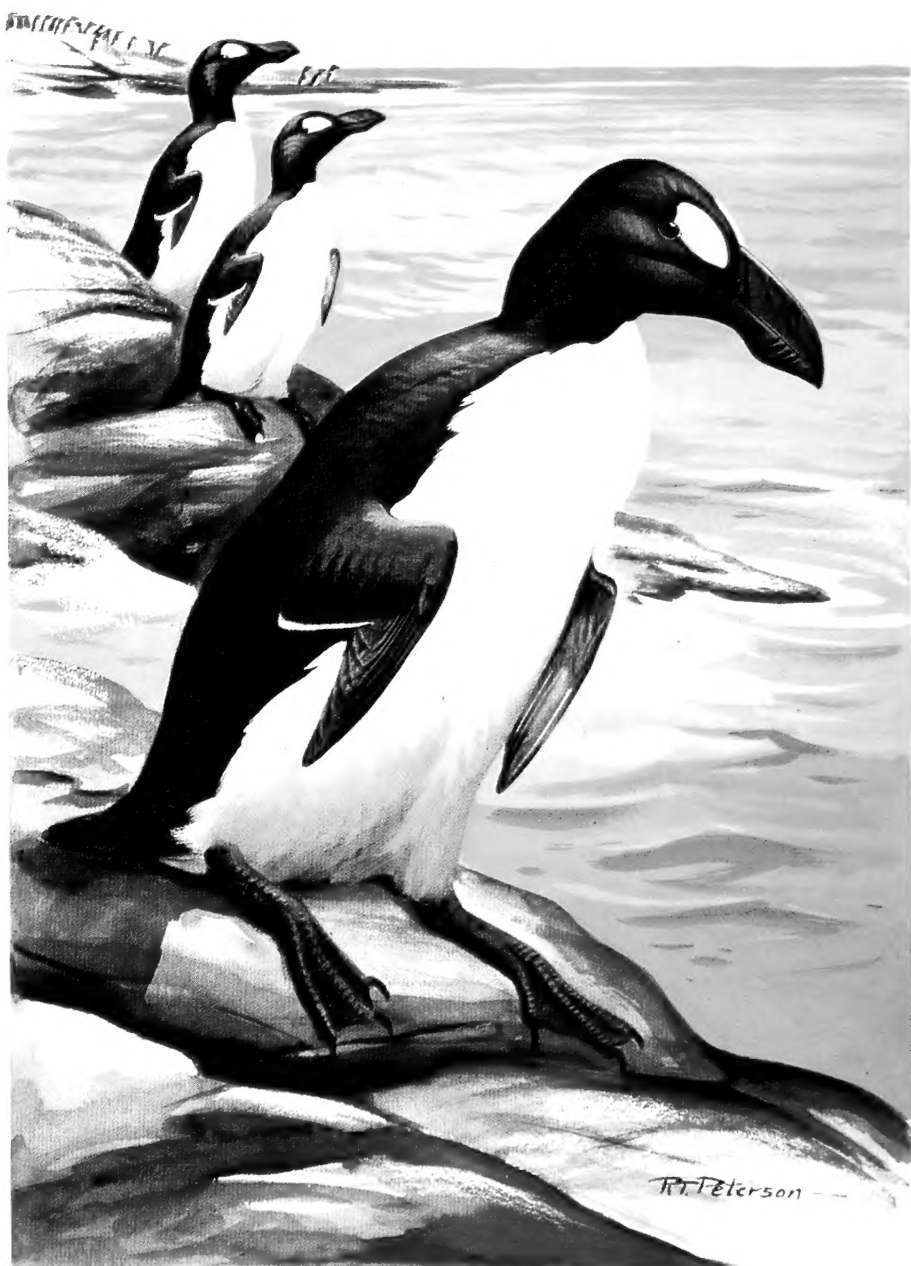
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CONSERVATION



GREAT AUKS OF FUNK ISLAND

Painted by Roger Tory Peterson (courtesy of the artist and the Government of Newfoundland and Labrador).

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WILLIAM A. MONTEVECCHI
and
LESLIE M. TUCK



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FOREWORD

On May 14, 1979, the family and friends of Dr. Leslie Tuck gathered at St. James' Church in St. John's to pay him their last respects. I had been honoured by his family in being entrusted with the delivery of the eulogy, and in the course of my remarks I observed that "the task that occupied . . . [Dr. Tuck's] most recent attention, the task that he undertook sensing that he was in a race with time, was the one that he thought of as his greatest potential contribution to the ornithology of this province . . . his enthusiasm for that work was inspirational to all those who had the opportunity to share his thoughts. Perhaps I could be so bold as to suggest that that work must be completed, that book must be published. I believe he would have wished no finer memorial."

At the time I was hardly aware of the magnitude of what I was proposing or of the task I was laying upon the shoulders of some person at that time unknown to me. I only knew that I felt a sense of deep deprivation and of personal loss, and I believed that if only his work could be continued and brought to fruition then death would indeed have no dominion.

Who would undertake that task? Who would complete the work? I did not know; but, nevertheless, I believed that someone among the community of scholars at Memorial that Les Tuck had embraced with such enthusiasm and affection would feel as I felt, would accept the challenge that I was offering. For my part, though I could be nothing other than an enthusiastic supporter, I was prepared nevertheless to provide all the moral and material assistance that lay within my competence to command.

Fortunately for me there was, among the congregation at the church, a young scholar from our University Psychology Department, Dr. Bill Montevocchi, who, during the two short years of Les's term as J. L. Paton Research Professor, had come to love the man for his worth and to respect him for his science. He, too, was very conscious of the unfinished work. Describing Les's last days in an "In Memoriam" article published in the *Auk*, Vol. 98, No. 3, July 1981, he wrote, "Almost all his energy was devoted to work on a book he had been planning for some time on an historical and ecological perspective of Newfoundland avifauna. Through a synthesis of sighting and banding data he had compiled over 35 . . . [years] . . . , he intended to update and modify Peters and Burleigh's (1951) *The Birds of Newfoundland*. But as he was sharply aware, health and time would be the deciding factors. His standards were too high to rush, and eventually it was evident that he would not complete his final task."

In fact his *magnum opus* was still, at the time of his death, several years from completion. Furthermore, as was clear from his avifaunal files, which together with his library and manuscripts had been bequeathed to the Memorial University Library, the preponderant part of the work he had completed and of the material he had assembled were of an historical character,

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even though he had never, to my knowledge, contemplated an historical monograph.

Indeed, the idea for such a monograph was, I believe, first broached when Bill Montevecchi approached me with a proposal that he should take up the task of honouring the promise I had made. Not only did he convince me that he was the right person to undertake the work, but in expatiating upon the significance of Newfoundland material in the development of North American ornithology, he convinced me of the importance of laying a solid historical foundation for the larger work to follow and which would more closely resemble the book conceived by Les Tuck.

In the intervening seven years the work has gone steadily forward. With the publication of this volume the historical foundation has been laid. That process represents the completion of an important phase of the main project. The work before us, however, should not be regarded as merely an appetizer for the main course to follow. Clearly it can stand alone as a significant piece of scholarship in its own right. Obviously, it will be an important companion volume to the larger work but it certainly will not be dependent upon that work for its value.

In the meantime, the task of bringing this monograph to completion has not impeded progress on the central project. Six summers of dedicated field work have supplemented and complemented the sighting and banding data already in hand. A talented young artist, Julie Zickefoose, has, under commission, prepared additional plates to accompany those of Roger Tory Peterson which were used in Peters and Burleigh's *The Birds of Newfoundland* and which will appear in the new work as well. In short, the enthusiasm and commitment of Bill Montevecchi have been matched with the moral and financial support that the University has been able to provide with gratifying effect. The dream will be realized. A new, definitive work on Newfoundland birds, and a work that is, moreover, laid upon a well-designed and expertly crafted historical foundation, will replace the standard work that has served us so well during the past forty years.

In the end, though it will please me greatly that I no longer need explain to visiting bird lovers that our standard reference book is badly dated and frequently misleading, it will please me a great deal more that my promise to Les Tuck will have been kept; that his name on the title page as co-author will signify the continuing presence of his spirit among us.

His name would, of course, have lived in any case. For he was the author of two remarkable books, *The Murres* and *The Snipes*, award-winning works of a consummate field biologist that remain definitive in their fields. But it is still good to know that the third definitive work he had envisioned will soon grace our bookshelves, while a fourth volume, though not part of his plan, will testify to the inspiration his friendship gave to another younger, but equally dedicated scientist, who has proven completely worthy of the trust reposed in him.

It is a long way from Great Island where, as we stumbled over the tussocks

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and among the puffin burrows on a moonless night, Les Tuck first told me of his final ambitious project. While the book we have here is not that of which we spoke on that occasion and to which we were each, in different ways committed, it has, nevertheless, grown from the same seminal notion. It is Bill Montevecchi's book but it owes much to Les Tuck's inspiration and work. What is more to the point, it is the forerunner of the greater work that will, in a real sense, be Les Tuck's book though it will have a great deal of Bill Montevecchi in it.

LESLIE HARRIS

President and Vice-Chancellor
Memorial University of Newfoundland.

PREFACE

The ideas that led to the preparation and publication of this book germinated from a complex interaction of people and events. More than 40 years ago Leslie M. Tuck began systematically documenting the occurrence of birds in Newfoundland and Labrador. He soon became *the* “bird authority” of the province. (An overview of his professional career and achievements has been presented elsewhere (Montevecchi, 1981).) In the early 1970s, soon after the 1972 publication of his second book, *The Snipes*, he committed himself to writing a book on the Newfoundland avifauna. Following his retirement in 1975 from a long and successful career with the Canadian Wildlife Service, he devoted most of his time to this task. This work was to replace Peters and Burleigh’s *The Birds of Newfoundland* (1951b) which, though outdated, is still the most comprehensive treatment of the island’s birds.

In 1977, through the efforts of Leslie Harris, President of Memorial University of Newfoundland, and Jon Lien and Graham Skanes, Tuck was appointed as a J. L. Paton Research Professor in the Department of Psychology. Here, as much as health problems would allow, he worked on the book, but when he died in 1979, the work he envisioned was some years from completion. His avifaunal files, manuscripts, and library were bequeathed to Memorial University of Newfoundland, where the work continues today.

Almost all of Tuck’s work on the project concerned historical aspects of Newfoundland’s ornithology, though it had not been his intention to prepare a monograph on this subject. When I assumed the task in 1980, research on the historical aspects of bird study in Newfoundland was intensified. As the significance of the Newfoundland material in the unfolding of North American ornithology came into focus, the work became monographic in proportion. This historical analysis lays the foundation upon which a comprehensive treatment of the current state of Newfoundland avifauna is being developed. That venture, in conjunction with the present work, is our overall objective.

April 1987

William A. Montevecchi

ACKNOWLEDGMENTS

Many people have made generous and important contributions to the present work. Raymond A. Paynter, Jr., provided a comfortable work environment in the Bird Department of the Museum of Comparative Zoology, Harvard University, where I spent an enjoyable sabbatical writing and tracking down old Newfoundland bird skins. Some of the final manuscript preparation was carried out while I was an Exchange Fellow at the Zoologisk Museum, Universitetet i Bergen, where Ingvar Byrkjedal and Anne Karin Hufthammer helped make my stay a most pleasant one. Anne Hart, Director of the Centre for Newfoundland Studies, graciously and generously granted me privileged use of the materials in the Centre's collection.

The frontispiece, painted by Roger Tory Peterson and owned by the government of Newfoundland and Labrador, originally appeared as black-and-white Figure 30 in *The Birds of Newfoundland* (Peters and Burleigh, 1951b). Julie Zickefoose drew the sketches of the Eskimo Curlew and Great Auk skull. Brian Harvey prepared the map of Baccalieu Island, and Marilyn Tuck drew Figures 7, 9, and 10. Antonio W. H. Damman, Gordon H. Farmer, and Robert Rogerson contributed figures, and Gary McManus helped with figure preparation.

Don Steele provided important information on J. J. Audubon's, Phillip Gosse's, and J. P. Howley's bird study in Newfoundland. Selma Barkham translated and contributed the material on the early Basque accounts of seabirds. Tom Arnholm translated Steenstrup's (1855) important paper on the Great Auk. John Ferrand, Jr., Sue Johnson, and Dave Snow provided some useful references. Guy Brassard and Peter Scott reviewed and commented on Reek's (1873) listing of Newfoundland flora. Fred Aldrich offered helpful encouragement in many instances. Searches of museum and archival collections for Newfoundland material were carried out by Ann Blum (Museum of Comparative Zoology Archives), M. Ralph Browning (U.S. National Museum), P. Colston (British Museum), Bruce Dilabio (National Museum of Canada), Anne Hart and Nancy Grenville (Centre for Newfoundland Studies, Memorial University Archives), J. M. Laughlin (Carnegie Museum of Natural History), Jay Pitocchelli (American Museum of Natural History), and Ed Tompkins (Newfoundland and Labrador Provincial Archives). Cathy Butler, Alison Pirie, Ruth Price, Donna Puddester, and Pat Wall helped with the typing of manuscripts. Eric Blundon, David K. Cairns, Richard Elliot, Don Huxter, Wayne Lidster, John E. Maunder, John F. Piatt, Pat Rice, Glen Ryan, and John Wells provided unpublished data, records, and information.

Research was supported by the Natural Science and Engineering Research Council of Canada (NSERC) via the Memorial University of Newfoundland President's Fund. Some of the findings related to seabirds (Chap. 9) were derived from research studies supported by NSERC Individual Operating Grants.

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I also owe special thanks to my colleagues, Jon Lien and Graham Skanes, who stimulated the necessary appointments and arrangements for Leslie Tuck and I to collaborate on this project. Since his direct involvement in the initiation of this project, Leslie Harris, President of Memorial University of Newfoundland, has been unflaggingly steadfast in his support, encouragement, and optimism for this project and all its ramifications. I thank him very much for this confidence. Mary Tuck's support and friendship has been invaluable throughout all stages and levels of the project. Les Tuck, the man who passed me the baton in this long-distance relay, inspired me with his courage and zest for life and with his straightforward commitment to and enthusiasm for wildlife study.

I am grateful to my parents, Aldo and Lorraine, for providing me with the opportunity and encouragement to study. I thank Janet, my wife, for helping me stay in touch with reality during the process. Without her support it is unlikely that the task would have been completed. Finally, I thank Nicholas, Gioia, and Marina for the light in their eyes.

HISTORICAL BACKGROUND OF NEWFOUNDLAND ORNITHOLOGY

Many millenia before the advent of written North American history, birds were important components in the spiritual beliefs of aboriginal peoples, as well as being sources of food. Information about these matters is especially well documented in Newfoundland, owing to some spectacular archaeological finds (J. A. Tuck, 1975, 1976) that include the first substantiated settlement by Norse Vikings in North America (Ingstad, 1977).

Its position in the western North Atlantic made Newfoundland a major gateway for explorers and colonizers of the New World (Fig. 1). Seabirds were especially important to these early voyagers because they served as navigational indicators of landfall and fishing banks. Moreover, trans-Atlantic crews replenished depleted fresh meat supplies at seabird colonies. Likewise, seasonal inhabitants and early residents hunted seabirds, landbirds, and waterfowl in coastal areas and collected eggs and chicks from nesting colonies. The significance of the use of seabirds by the settlers of northeastern North America has been likened to the utilization of bison in the subsequent westward expansion of the population (L. M. Tuck, 1967a). As a consequence, there is much documentation of the North American avifauna that began at the very outset of written New World history. Changes in species composition and populations at some of the major seabird colonies (e.g., Funk Island) have been recorded, with varying degrees of precision, for four and a half centuries.

From the beginning of the 16th century a large European fishery developed on the Grand Banks and inshore Newfoundland waters. Fisherman frequently took seabirds for food and used for bait many species that they did not eat. They also utilized feeding flocks of seabirds to locate schools of fish. The fish stocks, like all New World wildlife, appeared boundless to the Europeans, and such preceptions shaped their relationship to the new wilderness for the next 400 years.

In the 18th century two of the most eminent natural scientists of the day, Joseph Banks and George Cartwright, worked extensively in Newfoundland and Labrador. Their discoveries and careful efforts set new standards for natural history study in the New World. In the early 19th century John James Audubon gave systematic ornithology in the region a big boost through his trips to Quebec Labrador and to western Newfoundland. His *Ornithological Biographies* gave good coverage of a fair sampling of the regional avifauna. Following the initiative of these early naturalists, Newfoundland historians (Anspach and Bonnycastle) and geologists (Cormack, Jukes, and Howley) were the principle chroniclers of wildlife diversity, distribution, and abundance during the first half of the 19th century.

Sustained systematic ornithological study in Newfoundland began in ear-

HISTORICAL BACKGROUND OF NEWFOUNDLAND ORNITHOLOGY

nest around the middle of the 19th century. Ornithologists associated with centers of learning in the northeastern United States and in England came to the island to study birds. The fundamental ornithological questions of the day focused on taxonomy; specimen collection and preservation were the means to pursue these matters. Nineteenth century zoologists were keenly interested in the variation of insular populations (e.g., Darwin, 1859), and Newfoundland became a testing ground for ideas about subspeciation. From the late 19th century up through the middle of the present one, much was written about Newfoundland subspecies.

Many errors that exist in the early "scientific" literature of Newfoundland have been perpetuated through the years. In the present work especial effort has been made to resolve as many of these problems as possible. Also, persons who made significant contributions to Newfoundland ornithology, but who for one reason or another have remained relatively anonymous, have been identified (e.g., J. C. Cahoon).

During the 20th century Newfoundland's avifauna came under more intensive, yet unintegrated, study. These efforts culminated in Peters and Burleigh's extended investigation (1937–47) that resulted in the publication of *The Birds of Newfoundland* (1951b). In the present monograph an attempt has been made to trace to original sources the initial documentations of the occurrences of various species in Newfoundland up to the time of Peters and Burleigh's publication. Critical analysis underlies this review, and questionable material is indicated. Many questions remain and these will, we hope, stimulate further research.

Some of the most important seabird colonies in the world are on Newfoundland's east coast. Seabirds have received (usually suffered) the attention of natives, explorers, colonizers, residents, natural historians, and of past and present researchers. They are, therefore, the best understood component of the island's avifauna. A survey of the fluctuating population levels and of the diversity of species at major seabird breeding sites provides the basis for a synthesis of historical data.

Much less is known about historical aspects of terrestrial bird populations and their species diversity. The North American and world distributions of landbirds that occur in Newfoundland are useful in inferring their regional origins. And, also, the preoccupation that many early ornithologists had with subspecific classification permits consideration of patterns of adaptive radiation that have occurred on the island since former glaciations. Moreover, a substantial number of recent breeding range expansions to Newfoundland have been documented with varying degrees of detail. Most of the habitat changes that affect terrestrial avifauna are a consequence of human activity, the major influences in Newfoundland being fire, logging, settlement, and cultivation. Newfoundland, like other extremities of the North American continent, is well known for its high frequency and diversity of vagrant species; many records of first North American and first Canadian

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species occurrences have been made on the island. While vagrancy is facilitated by meteorologic and geographic factors, most changes in avifaunal diversity are the result of extinctions and introductions wrought by human hands. Those that have affected Newfoundland are of international significance.

Beginning with the first European incursions into North America, the exploitation of the New World fauna increased phenomenally, without check, over the next 400 years. North American environmental philosophies and legislative initiatives were developed in antithesis to the British system of aristocratic hunting privileges. Here wilderness and wildlife were common domain. This approach, however, proved inadequate in the New World setting (Lund, 1980). As the heavy toll on the wildlife became apparent, new ethics, legislation, and perspectives in regard to the utilization and conservation of the fauna slowly evolved. Ecological, aesthetic, and other nonconsumptive concerns have played important roles in shaping modern wildlife and environmental legislation. But, as in other rural areas around the world, Newfoundland has often been less affected by these more current trends that tend to germinate and flourish in heavily populated areas, often far removed from and out of close touch with wilderness regions (see Lowe and Pinhey, 1982; Hill, 1984).

Historical analyses are necessarily selective with regard to past events and materials deemed worthy of study (Mayr, 1982). The present work attempts to cover all of Newfoundland's developments that have contributed significantly to the unfolding of North American ornithology. It also surveys ornithological events in Labrador that are intricately entwined with those in Newfoundland. The theme is played out in the following way. Chapter 2 reviews the biophysical geography of insular Newfoundland as it relates to the avifauna. Our chronological treatment begins with the prehistoric evidence (Chap. 3) and progresses through the accounts of the first North American explorers and colonizers (Chap. 4), naturalists (Chap. 5), natural historians and geologists (Chap. 6), early ornithologists (Chap. 7), and recent ornithologists (Chap. 8). This chronological approach emphasizes individual efforts and has proved useful in pointing out contributions that have been obscured through time. To avoid presenting a static and fragmented view of the past, as often occurs in rigid chronologies (Mayr, 1982), important problematic issues and interactions between individuals and institutions have been addressed. Treatment of the seabird colony information provides an integration of past accounts and present findings (Chap. 9). Factors influencing patterns of landbird diversity are reviewed in Chapter 10. The main work concludes with a survey of the evolution of wildlife exploitation and conservation since the initial European involvements in North America (Chap. 11).

The status of all the birds of insular Newfoundland is indicated in a comprehensive list in Appendix I. Newfoundland has a rich tradition of local

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vernacularisms; the names that have been applied to birds, which are both fascinating and informative, are presented in Appendix II. An annotated treatment of the wilderness and wildlife parks and sanctuaries is given in Appendix III. The scientific names of plants and animals, except for birds (see Appendix I), appear in Appendix IV.

2

THE ISLAND

GEOGRAPHY

Situated in the North Atlantic between 46° and 52° N. lat., Newfoundland has a landmass of 112,300 sq. km and is the sixteenth largest island in the world (Yoxall, 1981). Newfoundland is geographically distinct from, but politically linked with, Labrador, the mainland component of the Province of Newfoundland and Labrador (see Figs. 1, 2). The Avalon Peninsula, its southeasternmost portion, is at the same latitude as the Bay of Biscay, France; St. Anthony on the tip of Northern Peninsula is roughly at the same latitude as London, England (Fig. 1). Newfoundland is approximately 2,600 km from the coast of Ireland, the nearest land in Europe, and 1,360 km from Cape Farewell, the most southerly tip of Greenland (Fig. 2). Close to the North American mainland, Newfoundland's northwest coast is separated from Labrador by the Strait of Belle Isle, which is less than 15 km at its narrowest, and the southwestern coast is less than 100 km from Cape Breton Island, Nova Scotia, across the Cabot Strait. The island's location favors the occurrence of vagrant birds from continental North America, Greenland, Iceland, Scandinavia, and Europe.

The island of Newfoundland is a tilted plateau rising northwestward from the east coast. Western Newfoundland, where the plateau terminates in the Long Range Mountains, is the most mountainous part and rises to over 600 m in some locations. The large lake basins are deep and surrounded by wooded hills, Gander Lake and Grand Lake being good examples. Much of the plateau, especially the interior, is similar to alpine barrens and is interspersed with shallow, rocky ponds and lakes. The heavily indented coastline, almost 10,000 km in perimeter, has been extensively drowned, and ancient valleys now form large bays separated by elongated peninsulas. Deep fjords occur on the southwestern and northeastern coasts. The major mountain ranges, valleys, and rivers run northeast/southwest and produce a well-defined "grain" to the island (Gutsell, 1949).

Newfoundland lies at the northeastern tip of the Appalachian Mountains chain and is a showplace of an ancient continental separation (Wilson, 1966; Neale, 1974). Modern plate tectonics has established that the Appalachians and the Caledonian Mountains of Europe were part of the same system. Newfoundland was closest to where the separation took place when the continents drifted apart about 150 million years ago. By the time the Atlantic Ocean had formed, parts of the Afro-European continent remained welded to Newfoundland's North American western sector (Neale, 1971).

GLACIATION

During the last two million years of the Pleistocene, Newfoundland and the rest of Canada were covered several times by glaciers. Results of Pleis-

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FIG. 1. William Russell's 1777 map of Newfoundland and surrounding areas.

tocene glaciation in Newfoundland were, however, obliterated by a more recent Wisconsin glaciation, which consisted of a series of ice caps radiating from four centers near Grand Lake, Grand Falls, the head of St. Mary's Bay, and the Northern Peninsula (Neale, 1971; Rogerson, 1983; Fig. 3). The glaciers of Ellesmere and Baffin Islands and of the Greenland Ice Cap are present-day remnants of Wisconsin ice. Glaciers carried much of the soil onto the continental shelf, scraping and polishing bedrock as they moved over the island. When the ice melted, it left behind a rough unsorted cover of large boulders erratically scattered about the countryside. Biological and geological evidence indicates that some areas remained unglaciated during the Wisconsin period (Rogerson, 1981; also see p. 187), which ended approximately ten thousand years ago (Macpherson and Macpherson, 1981).

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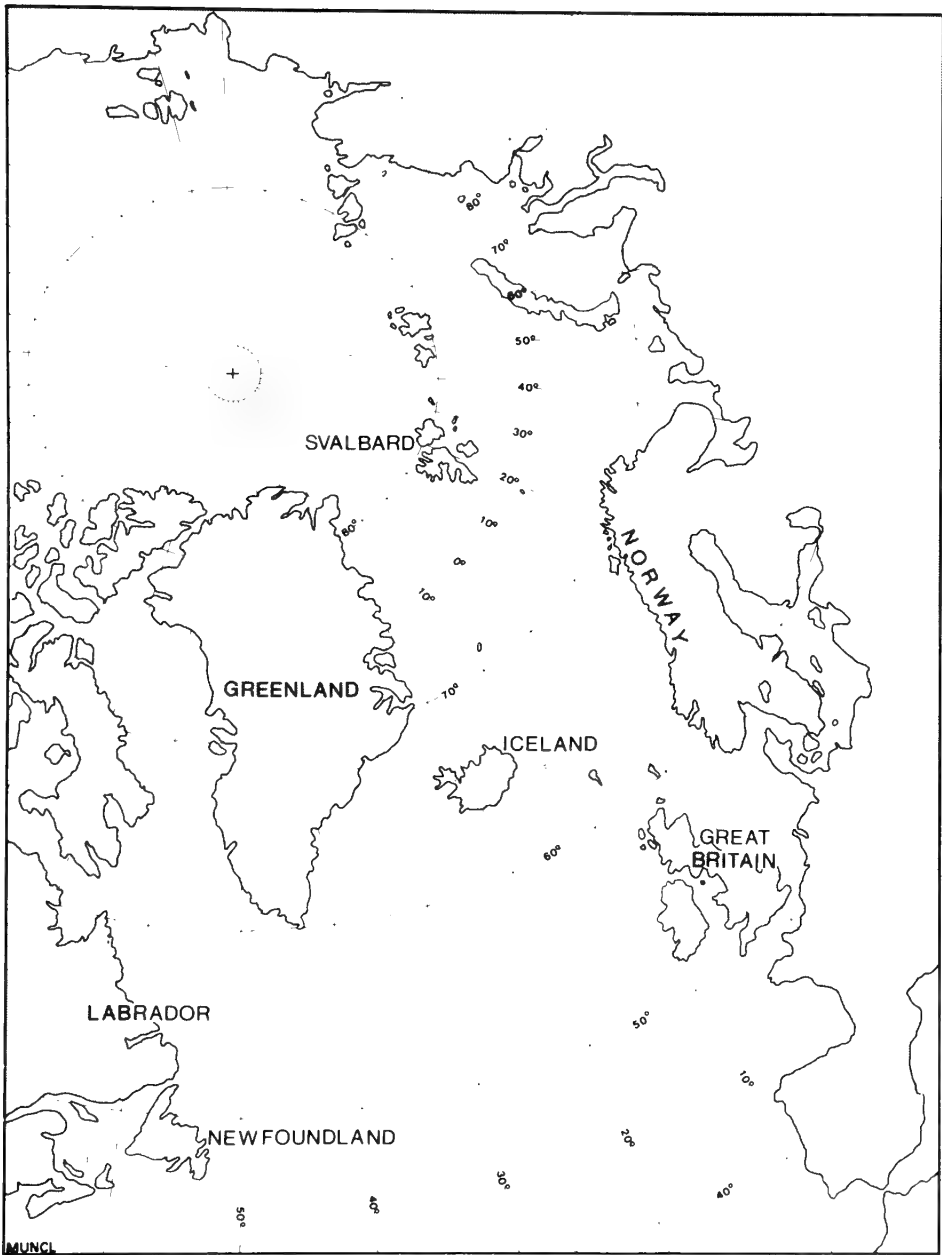


FIG. 2. Insular Newfoundland is at the easternmost limits of continental North America in the northwestern Atlantic.

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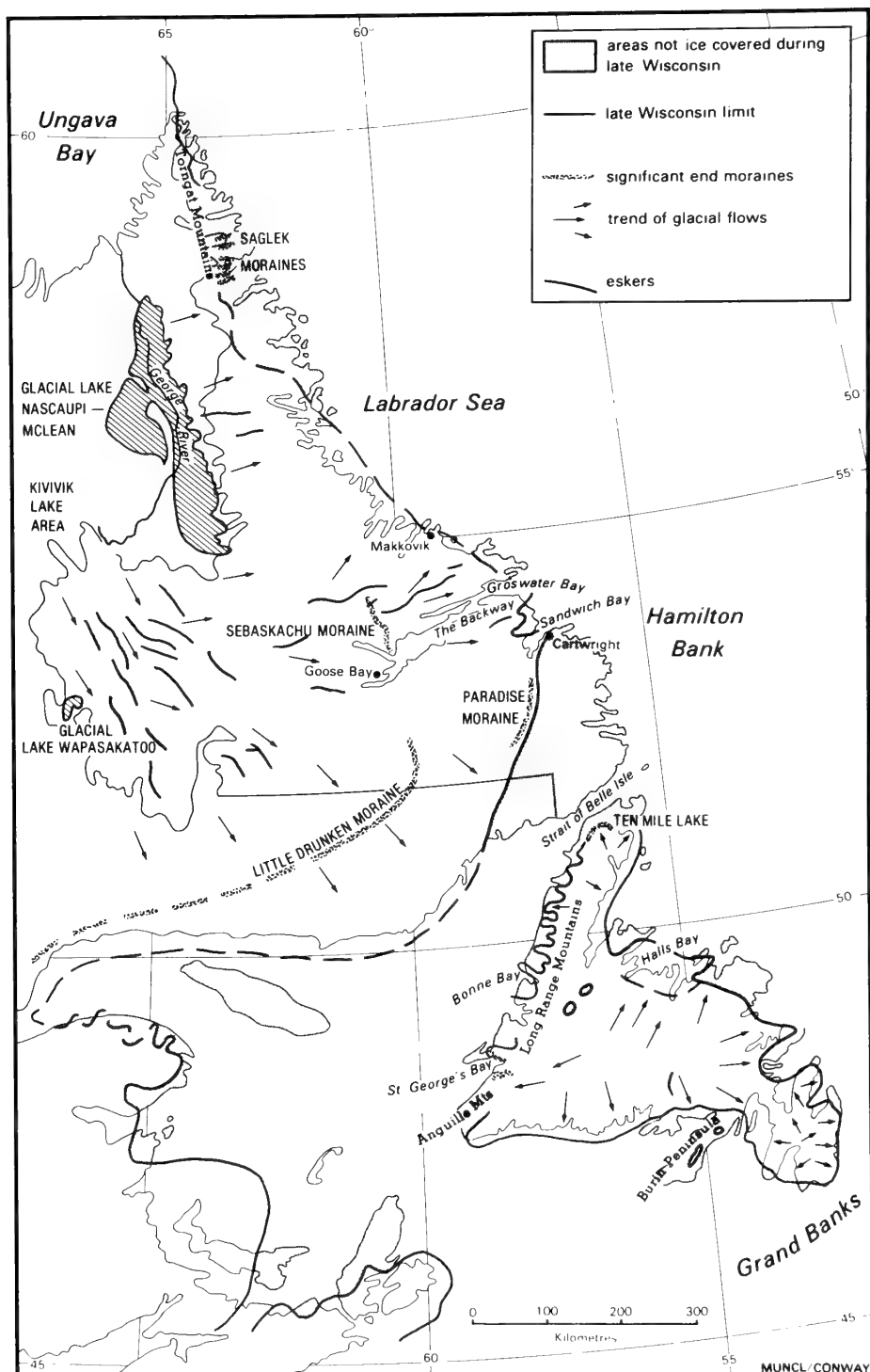


FIG. 3. Schematic pattern of the glacial figures of the late Wisconsin glaciation (courtesy of R. Rogerson).

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LANDFORMS

The island's landforms are characterized by erosion and the deposition of glacial debris. Bedrock outcrops are often scratched, striated, and polished. Outwash mixtures of stone, sand, silt, and clay deposited in the river valleys and at sea level form the basis for the island's poor soils. As the glaciers melted and retreated, the sea level rose and coastal areas, which had been warped down into the earth's crust by the great weight of ice, were covered by ocean waters. The coastal lands slowly rebounded over 3,000 to 5,000 years after the ice mass had moved (Rogerson, 1983), and today raised beaches can be found as high as 150 m above sea level. Apart from bog development and the formation of barrier beaches from redistributed glacial pebbles, there have been few significant modifications of the land surface since the last glaciers melted.

LABRADOR CURRENT

Arctic waters from Hudson Bay and the Davis Strait converge off Cape Chidley to form the Labrador Current which flows along the Labrador and Newfoundland coasts. Off Cape Race on the southeastern tip of Newfoundland, the current is deflected westward by the influence of the Gulf Stream and then northward again, so that in effect it wraps the island with arctic water (Farmer, 1981; Fig. 4). Each spring the Labrador Current carries southward the pack ice and icebergs, which a few months earlier existed as an unbroken cover in Baffin Bay and the eastern Canadian Arctic (Brown, 1983). In summer the nutrient-rich current supports an enormous biomass of plankton which is at the base of the food chain that supports the phenomenal stocks of fish, seabirds, and marine mammals inhabiting the waters of the Grand Banks. The productive cold water is also the lifeblood of the major seabird colonies that flourish along Newfoundland's east coast (Chap. 9). The current also assists the southward migration of the herds of Harp Seals that whelp on the pack ice in the Gulf of St. Lawrence and off Labrador's southeastern coast.

GRAND BANKS

The southeastern portion of Newfoundland's continental shelf forms the Grand Banks, a vast apron that makes up an area larger than the island itself (Fig. 5) and is one of the largest portions of continental shelf in the world (Farmer, 1981). The abundant fish of the banks were responsible for most of the 16th century European incursions into North America (Chap. 4). Newfoundland was little more than a large fishing depot whose ports were active during summer and virtually uninhabited in winter (Lindroth, 1957). Marine birds that are seasonally abundant on the Grand Banks include sheawaters, fulmars, kittiwakes, and alcids.

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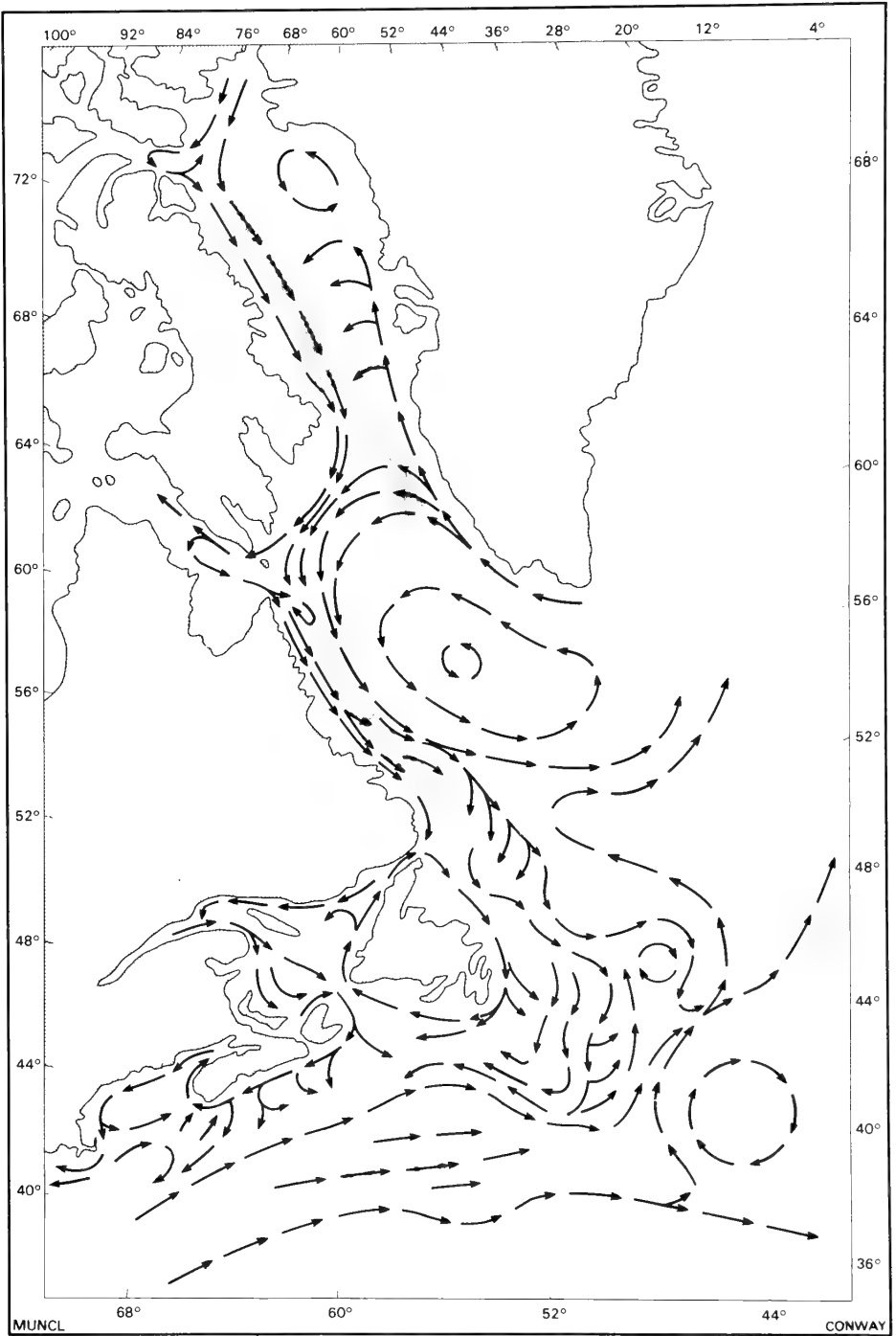


FIG. 4. Major surface currents off Canada's east coast (courtesy of G. H. Farmer).

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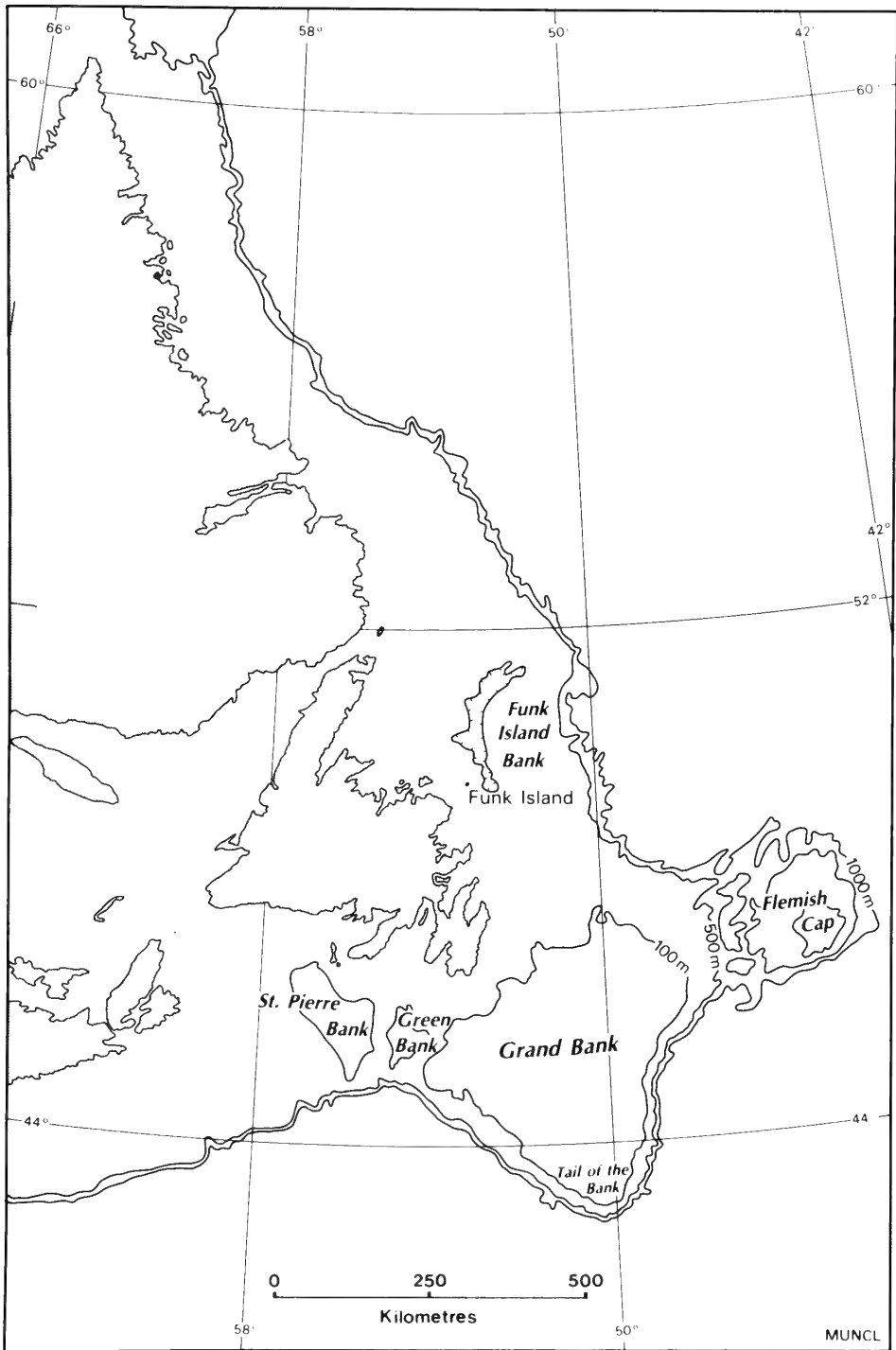


FIG. 5. The Grand Banks off southeastern Newfoundland.

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PACK ICE AND ICEBERGS

Sea ice develops rapidly over the low salinity waters off Labrador and Newfoundland (Farmer, 1981), and by late winter much of the coast is closed in by ice. In addition to landfast ice, arctic pack ice that originates in the Davis and Hudson Straits reaches Newfoundland in late December and often extends 150 km eastward. In late winter and early spring, Ivory Gulls are sometimes sighted during northeast winds when the ice is in. The pack ice, accompanied by icebergs, moves at approximately 10 km per day and reaches its southern limit in late March, after which it disintegrates in the warmer Atlantic waters.

Icebergs calved from the glaciers in western Greenland and in the Canadian high arctic usually take two years to reach Newfoundland (Brown, 1983). Those approaching land frequently ground in shallow water and may at times be observed near seabird colonies during summer.

CLIMATE

In general, the climate of all but the interior can be considered maritime. Temperature range is low; winters are cold but rarely severe, and summers mild to warm. Extreme temperatures in all seasons are moderated by the thermal inertia of the surrounding sea. The island's overall shape, size, indented coastline, and western mountain axis all contribute to its considerable climatic variability.

Newfoundland's climate is the outcome of three interrelated influences: (1) the surrounding cold ocean, (2) the atmospheric circulation of the mid-latitude northern hemisphere, and (3) the island's location off the east coast of the North American mainland (Banfield, 1983). The Labrador Current deflects the midsummer east/west isocline of 15° C air temperature (at sea level) approximately three degrees of latitude southward near Newfoundland (Banfield, 1983) and produces the most southerly arctic penetration in the world (Hare, 1952; Erskine, 1977). Owing to its location off the eastern edge of North America, Newfoundland is influenced by continental air masses, and frequent high winds are a characteristic feature of the island's weather. As will be shown in Chapter 10, these patterns facilitate the occurrence of vagrant landbirds in Newfoundland. West and northwest winds predominate in winter, reactions to the sharp gradient between a high pressure area centered west of Hudson's Bay and the Icelandic low pressure system. Northerly winds increase in frequency during spring as the Canadian sub-arctic anticyclone moves eastward. In summer southwesterlies prevail, as the northerly expansion of the Bermuda subtropical anticyclone interacts with the Canadian low pressure mass. Autumn winds shift to westerly as the Icelandic low strengthens once again (Banfield, 1983).

Winter.—Using the date on which the average daily air temperature falls to 0° C as the onset of winter, there is about a four week spread in its arrival

over the island. Winter, so defined, arrives in mid-November on the Northern Peninsula but not until the second week of December on the Avalon and Burin Peninsulas. These temporal variations result primarily from differences in latitude and from the gradual, though irregular, southward penetration of the Arctic Front.

Arctic air masses rarely occur over the island, especially in the southeast. Consequently, average daily temperatures range from -9.5°C at St. Anthony to -4.5°C at St. John's in February, the coldest month. Even in winter temperatures at times climb over 10°C in southeastern Newfoundland behind warm fronts that originate in the southern United States.

Winter precipitation varies between the rather dry weather over much of the Northern Peninsula to the frequent precipitation of southeastern Newfoundland. Average winter precipitation at St. John's is 548 mm, of which 47% is snow. On the Northern Peninsula there is considerably less winter precipitation but more snow, especially on and west of the Long Range Mountains where the greatest snowfalls occur (Banfield, 1983). Virtually snowless winters are not uncommon on the Avalon and Burin Peninsulas.

Freezing rain is fairly common from mid- to late winter, especially in southeastern Newfoundland (Banfield, 1983). Ice accretion up to several centimeters on exposed surfaces is not uncommon and is locally referred to as "glitter" or "glaze". Damage to trees and shrubs can be extensive, particularly if strong winds accompany the freezing rain. A late winter storm in 1984 that collapsed the major electric power corridor to eastern Newfoundland is a case in point. Such storms can have devastating effects on avian winter residents.

Spring.—Spring is remarkably late. Arctic pack ice (and icebergs) that at times almost encircles the island keeps sea temperatures close to freezing until late May. Cold arctic waters and sea ice delay the onset of spring in coastal areas, where late frosts and snow are common (Farmer, 1981). These events are contingent upon the irregular retreat of the Arctic Front and the prevailing northerly circulation off the Labrador Current.

Ice does not normally disappear from the rivers of southeastern Newfoundland until early April and not until late April on the Northern Peninsula. For ponds and bays the dates are two weeks later.

The onset of the spring vegetative season, defined as that date on which the mean daily air temperature rises above 6°C , shows considerable temporal range on the island. The interior warms up earliest, the south coast and Avalon Peninsula are two weeks later in late May, and the Northern Peninsula does not usually begin to warm until early or mid-June. In early spring warm air masses from the Caribbean occasionally bring "unseasonal" temperatures and sometimes carry vagrant birds that were apparently crossing the Gulf of Mexico on migration to North America (L. M. Tuck, 1967a; see, also, p. 200).

Newfoundland is well-known for its fogs which are common in late spring

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and summer when warm moist air blowing northward off the Gulf Stream is chilled and condenses upon arrival over the Labrador Current (Steele, et al., 1979). The effect on the island is largely coastal; south coasts are heavily fogged-in during southeasterly winds, and east coast areas are similarly blanketed during easterly winds. Inland areas, that are less influenced by oceanographic factors, are relatively fog free.

Summer.—Summers are comparatively short and benign. Throughout the season the island is an area of relative warmth set in a cold marine environment. Average inland temperatures are considerably higher than coastal ones. By mid-July prevailing winds are southwesterly, ensuring more frequent warm airstreams. On days when the wind is from the east or northeast, i.e., off the Labrador Current, the weather can be raw with near saturation humidities, overcast skies, drizzle, and often fog. On average, however, July and August have mean monthly temperatures only a few degrees cooler than those in Montreal or Toronto.

Fall.—Fall is a season of rapidly declining temperatures and of intense westerly and southwesterly storms. The center of lowest pressure now shifts to the north coast, and a relatively high pressure area over North America causes a westerly flow of cool air. Autumn is also the wettest season, except for the Avalon Peninsula where most rain falls in winter (Banfield, 1983).

ECOREGIONS

The island's topography and the effect of the surrounding cold ocean produce very irregular vegetation zonations (Damman, 1983). For convenience, Newfoundland can be coarsely partitioned into nine ecological/biophysical regions: Western Newfoundland, Central Newfoundland, North Shore, Northern Peninsula Forest, Avalon Forest, Maritime Barrens, Eastern Hyper-oceanic Barrens, Long Range Barrens, and Strait of Belle Isle (Damman, 1983; Fig. 6). The vegetational and landscape changes between these regions are obvious even to the casual observer and an overview of the ecoregions gives a good feel for the variety of avian habitats on the island.

The Western Region is generally more fertile than other areas and is climatically the most favorable for plant growth (Damman, 1983). The region has a rugged topography, and the forests are predominantly mixed coniferous, with Balsam Fir the principal species. Tall deciduous stands are numerous, especially in logged-over areas, with White Birch and Trembling Aspen the major components. Areas of blanket bog, lush alluvial alder swamps, and agricultural areas contribute to the mosaic of avian habitats and help give this region the highest avian species diversity. Many birds that are more common in nearby Nova Scotia just reach this area of Newfoundland, where they are at the northeastern limits of their North American breeding ranges. For instance, the Great Blue Heron, Least Flycatcher, Veery, Solitary Vireo, and Bay-breasted Warbler are uncommon, though regular, in the Codroy

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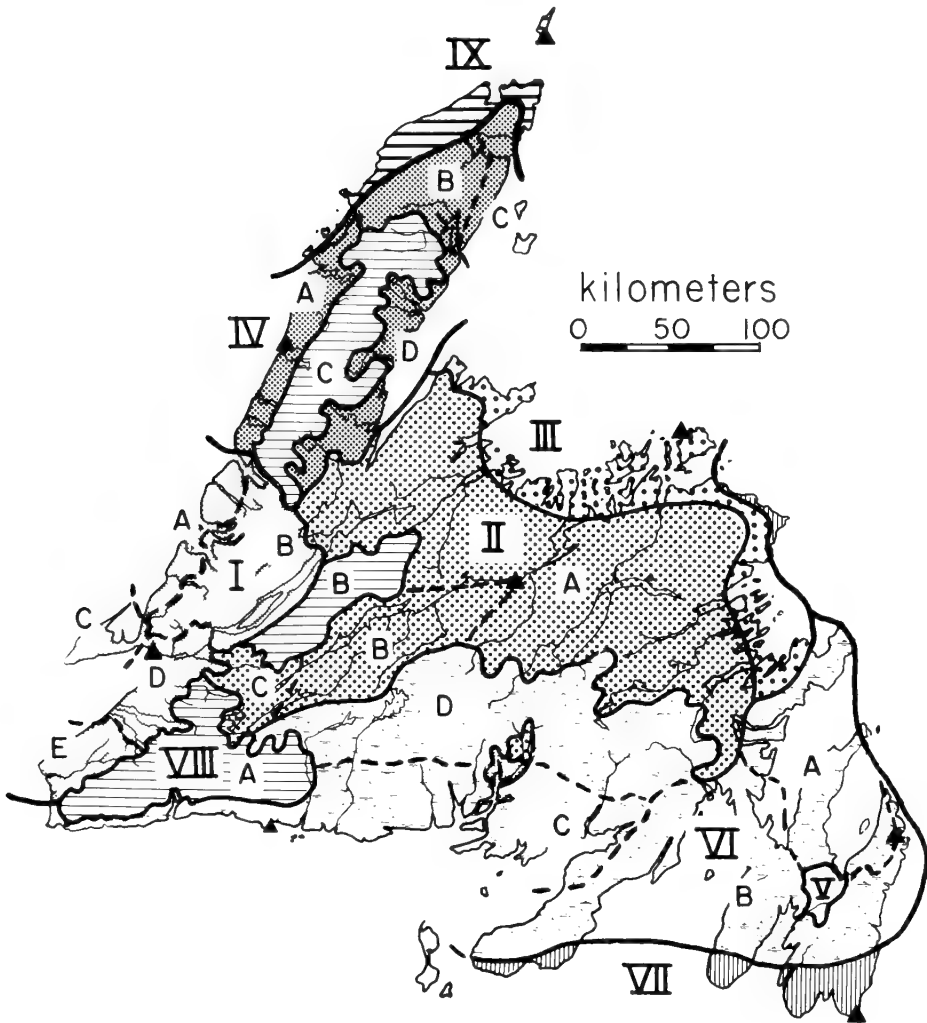


FIG. 6. Damman's (1983) ecoregions of Newfoundland: I. Western Newfoundland; II. Central Newfoundland; III. North Shore; IV. Northern Peninsula Forest; V. Avalon Forest; VI. Maritime Barrens; VII. Eastern Hyper-oceanic Barrens; VIII. Long Range Barrens; IX. Strait of Belle Isle (courtesy of A. W. H. Damman).

and Humber Valley regions and relatively rare elsewhere on the island.

The Central Region has a heavily forested, gently rolling topography and the most continental climate of any part of the island. The highest and lowest temperatures are recorded here. Fir dominates sites not recently disturbed by fire, and White Birch stands occur locally (Damman, 1983). Black Spruce forests are also common, with tall stands often bordering rich peat bogs. The locally distributed Palm Warbler and Olive-sided Flycatcher are

characteristic of this muskeg type habitat. The Gray Jay, Hermit Thrush, and Magnolia, Black-throated Green, and Black-and-white Warblers are common inhabitants of the central forest (see, also, p. 29). Breeding birds of the deciduous forests include Ruffed Grouse, Swainson's Thrush, American Redstart, and Ovenbird (Erskine, 1977). In many areas where over-mature White Birch has been left standing during pulp wood logging operations, the decayed remains provide nest sites for hole-nesters, such as woodpeckers, Black-capped Chickadees and Tree Swallows.

The Northshore Ecoregion is represented by a northern coastal zone that extends from the Bonavista Peninsula to the Great Northern Peninsula (Fig. 6) and includes the forested portions of the peninsula, where Balsam Fir predominates. Owing to wind exposure, forest height deteriorates to scrub then disappears into barrens as one moves coastward. The Gray-cheeked Thrush and Fox Sparrow are typical birds in this ecoregion.

The Avalon Forest, situated within the Maritime Barrens Ecoregion in the sheltered central area of the Avalon Peninsula (Fig. 6), is the smallest ecoregion (500 km²). The Hermit Thrush, Golden-crowned Kinglet, Fox Sparrow, Red Crossbill, and Pine Grosbeak are typical for this region. Several woodland species, such as Tennessee and Magnolia Warblers and Lincoln's Sparrow, which occur commonly over most of the island, are generally very scarce on the Avalon Peninsula.

Characterized by bogs, fens, and dwarf shrub heaths, the Maritime Barrens Ecoregion is large and includes almost all of the Avalon and Burin Peninsulas, as well as the central barrens (Fig. 6). Fire has played a major role in shaping the landscape, which was once heavily forested (Damman, 1983). *Kalmia* shrubs dominate the heath, and *Rhodora* and *Vaccinium angustifolium* are also abundant. Crowberry is common on exposed sites, where Horned Larks nest (Lamberton, 1976b; Cannings, 1977) and where migrating flocks of Whimbrels and Lesser Golden Plovers stop to feed and fatten in late summer and early fall. The Eastern Hyper-oceanic Barrens Ecoregion only includes a few outer tips of the Maritime Barrens peninsulas (Fig. 6). These exposed areas are carpeted with moss-lichen associations, tuckamoor, and blanket bogs; forests have never existed in this region. The Horned Lark, Water Pipit, and Savannah Sparrow are commonly associated with this habitat.

The highlands that extend from the southwestern coast to the tip of the Northern Peninsula make up the Long Range Barrens (Fig. 6), where tuckamoor and heath dominate. Willow Ptarmigan are common in all barren regions, and Rock Ptarmigan occupy the highest, most exposed sites. The Least Sandpiper nests in boggy areas, and common passerines include the American Tree Sparrow, which breeds extensively on the Long Range Plateau, and the Common Redpoll, a more widespread species typical of open coniferous woods with alder brush. The small Strait of Belle Isle Ecoregion is comprised of the bleak northernmost tip of the Northern Peninsula (Fig. 6) and is the most tundra-like region in Newfoundland. The most charac-

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teristic bird of this somewhat depauperate region is the White-crowned Sparrow, which reaches the southern limit of its eastern North American breeding range about here. This area is also distinctive for the frequency of visits by such typically arctic species as Ivory Gull, Gyrfalcon, Lapland Longspur, and Hoary Redpoll.

From this large scale view of the ecoregions we move to a finer description of some of the major habitat types.

FORESTS

Just over half (56%), or about 6,500,000 hectares of the island's area is presently forested. Approximately 4,000,000 hectares are considered "productive", i.e. economically exploitable, and 2,500,000 hectares are "non-productive", by present forest industry standards. The remaining 44% of the land (about 5,000,000 hectares) consists of peatlands, barrens, and fresh water. Less than 1% of the land has been cleared for urban and agricultural uses (Page, et al., 1974).

Balsam Fir and both Black and White Spruce are the primary conifers. Fir occurs on the richer sites, spruce on the poorer soils (Damman, 1964). These are the typical boreal forests that stretch across North America south of the tundra. Softwoods occupy about 75% of all economically exploitable forest land and are found on all parts of the island. They form the dense, dark green mantle that is so characteristic of the Newfoundland landscape (Page, et al., 1974).

Balsam Fir is the most abundant evergreen, comprising almost half of the island's trees. It occupies many forest sites but is most abundant and grows best on moist, well-drained soils. Mature trees can grow to heights of 21–24 m in 70 to 100 years on favorable sites, but are usually only between 9 and 12 m tall. In Newfoundland, Balsam Fir is a climax species that is very susceptible, especially when overmature, to serious damage from insects (Rendell, et al., 1977). Some birds that occur in fir and that are not usually found in pure spruce stands include Red-breasted Nuthatch, Tennessee Warbler, Black-throated Green Warbler, Ovenbird, American Redstart, and Purple Finch (Erskine, 1977). The Ovenbird and redstart are also found in mixed and deciduous boreal forests.

Black Spruce, accounting for just over a third of the island's conifers, is restricted to nutrient-poor soils (Damman, 1964) and is often the major species on both very wet and very dry sites. It is usually displaced from the most fertile sites by Balsam Fir which grows faster in early life. Mature Black Spruce can attain heights of 12–18 m in Newfoundland, although heights of less than 10 m are much more common. On exposed or very wet sites Black Spruce may be dwarfed to a shrub that grows thick and tight to the ground. Such retarded growths of either Black Spruce or Balsam Fir are locally referred to as "tuckamoor", or more simply "tuck". Black Spruce is relatively long-lived, and 150–200 year-old trees are not uncommon. Black Spruce regen-

eration is facilitated by forest fires because intense heat causes its cones to open and drop their long-lived seeds (Damman, 1964). In areas where fires are frequent the species often dominates the forest (J. S. Rowe, 1977). Black Spruce stands are the most characteristic and widespread forest type in the Canadian boreal region (Erskine, 1977). Birds associated with spruce and spruce/fir stands include Winter Wren, Swainson's Thrush, Golden-crowned Kinglet, Blackpoll and Magnolia Warblers, Northern Waterthrush, Dark-eyed Junco, and White-throated Sparrow (see, also, Erskine, 1977).

White Spruce, a minor forest component, is very resistant to exposure and is most abundant in coastal areas and as a pioneer in abandoned fields and similarly disturbed sites. It can live to 100 years and grows to heights of 24–27 m on the best sites (Page, et al., 1974). Large flocks of White-winged Crossbill are sometimes encountered in coastal white spruce stands in years when the erratic bird is abundant (J. Wells, pers. comm.).

Larch, also referred to as “juniper” or “tamarack” in Newfoundland, is another common conifer. The species is highly light-dependent and rarely occurs in pure stands. It is the only conifer that annually sheds its needles, and its golden autumn coloration lends an appealing glow to the evergreen forests. Owing to its tolerance of a broad range of soil conditions, larch can be found growing in forested bogs, gravel, and dry sands. At a mature age of about 70 years, heights do not usually exceed 13 m (Page, et al., 1974).

Red Pine stands occur in only a few scattered localities in central Newfoundland, where the species is at the natural limit of its range and can survive only on dry sandy or gravelly soils that warm rapidly in spring. It probably cannot grow to a height of more than 12 m on the island (Page, et al., 1974).

Before the present century White Pine was common in some Newfoundland forests and was often used in house- and ship-building. Newfoundland White Pine was also in demand for spars for British Naval ships (Mannion, 1977). These conifers can live to 300 years or more, and grow to heights of 24 m with diameters up to 1.2 m. Much of the White Pine became over-mature, and many unharvested trees were killed, or severely damaged, by White Pine blister rust, an introduced disease. At present White Pine can be found in central and western Newfoundland, usually scattered through stands of other species. These remaining specimens are usually degenerating, and their partly dead, often misshapened, tops are a consequence of age (probably over 200 years) and damage by blister rust (Page, et al., 1974). Berry bushes of the genus *Ribes* (e.g., red currant, gooseberry) are intermediate hosts of White Pine blister rust, and often grow in burnt- and cut-over areas. This circumstance may be partially responsible for the lack of young regenerating White Pine in Newfoundland.

Newfoundland's hardwood forests develop after fires destroy climax coniferous stands on rich sites (Damman, 1964). White Birch, the most common hardwood, occurs throughout the island, often as a minor component of softwood stands and as a more dominant component of many mixed or

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hardwood stands in the river valleys of central and western Newfoundland. It may live to more than 100 years and attain heights of 15–21 m on moist, fertile sites. White Birch presently comprises 11% of the island's forests (Page, et al., 1974). Yellow Birch, found locally in mixed stands in western Newfoundland, can grow to 18–21 m in height and to 1 m in diameter. Trembling Aspen is second to White Birch in hardwood abundance. In sheltered locations on well-drained soils, it can attain heights of 24–30 m. Balsam Poplar, Pin Cherry, and Red Maple are other hardwoods of the island's forests that are nowhere abundant and most common in the river valleys of central and western Newfoundland.

PEATLANDS

In Newfoundland 25% of the surface soil (2,000,000 hectares) is peatland (Wells and Pollet, 1983). Peatlands are poorly drained, basically acidic, mineral-deficient organic soils which inhibit extensive tree growth. Three peatland types, bogs, fens, and swamps, occur in Newfoundland. Bogs and fens are common and widespread, and each will be discussed briefly.

Boglands.—A substantial portion of the island's peatland is raised or blanket bog covered with undecomposed *Sphagnum* and undulating hummocks formed by mosses, such as *Rhacomitrium languginosum* and associated lichens. The Pitcher-plant, the provincial flower of Newfoundland and Labrador, Bake-apple, and the Crowberry also occur commonly.

Deforestation often facilitates bog formation. For instance, Ingstad (1969), commenting on the changed feature of the landscape at L'Anse aux Meadows (at the tip of the Great Northern Peninsula) since the Norsk occupation, stated that the present limit of the forests in that region is eight miles from the shore, and that at one time

. . . the forests extended almost all the way to the coast but in the course of time it has been cut down by the fisherman and there have also been forest fires. . . . During our excavations we came upon stumps and large roots of trees. . . . The reduction of the forests must have had a number of different consequences. When the roots could no longer hold on to the moisture in the ground, it was so much easier for bogs to form.

Sedge bogs are formed in nutrient-rich pockets that occur in shallow peatlands. In a typical Newfoundland sedge bog the principal mosses are *Sphagnum fallax* and *S. augustifolia*, and sedges, such as *Carex exilis*, *C. michauxiana*, and *C. livida*, are usually quite common. Goldthread, Bog Goldenrod, False Solomon's Seal, Bogbean, Bog Aster, and Canadian Burnet are also typical. Sweet Gale or Bog Myrtle is the most common shrub.

Bogs and fens attract many of the same avian species. Typical birds of extensive bogland are American Bittern, Canada Goose, Least Sandpiper,

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Common Snipe, Greater Yellowlegs, Common Yellowthroat, and Lincoln's and Swamp Sparrows.

Fens.—Fens develop on the wet, shallow peatlands nearest the forests and where there is considerable surface influence from a mineral substrate. Ground cover is a moss/sedge/low shrub complex. Dispersed Larch is the most characteristic tree of Newfoundland fens. Some botanists describe such sites as tamarack or forested fens. Tall shrubs sometimes form dense, almost impenetrable, communities in Newfoundland fens, the most widespread being Bog Alder, willows, Shadbush, and birches, such as *Betula glandulosa*. Bog Myrtle is a dominant and rather extensive low shrub in the fens; others are Northern Fly-honeysuckle and Bog Rose. Abundant herbs include Canadian Burnet, Bog Aster, and Tall Meadow-rue. Pockets, or even extensive tracts, of sedges, grasses, and low shrubs sometimes give fens an overall aspect of meadowland. Fens are a preferred habitat of American Bittern, Green-winged Teal, Common Snipe, Greater Yellowlegs, and a variety of passerines, including the Rusty Blackbird (L. M. Tuck, 1972).

BARRENS

Nearly 2,000,000 hectares, particularly on the Avalon Peninsula, in the interior, and on the Long Range Plateau, that are covered principally with *Kalmia* and arctic alpine plants, such as *Empetrum*, have been traditionally called "barrens" (Meades, 1983). This is the habitat of caribou and Willow Ptarmigan. Banks (1766) defined the barrens simply as ". . . the places where wood does not grow." Anspach (1819) was more explicit:

What is known of [the interior of Newfoundland] consists of a rocky and barren soil, steep hills covered with bad wood, some narrow and sandy valleys and extensive plains covered either with heath or with rocky surfaces, more or less extensive, where not a tree or shrub is to be seen, and which are from thence called Barrens.

Jukes (1842) provided the most detailed description:

The barrens of Newfoundland are those districts which occupy the summits of the hills and ridges, and other elevated and exposed tracts. They are covered with a thin and scrubby vegetation, consisting of berry-bearing plants and dwarf bushes of various species, and are somewhat similar in appearance to the moorlands of the north of England, differing only in the kind of vegetation, and in there being less of it. Bare patches of gravel and boulders, and crumbling fragments of rock, are frequently met with upon the barrens, and they are generally altogether destitute of vegetable soil.

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Richardson (1979) explains the formation of most barrens: "After disturbance by logging or fire, some productive forest sites in Newfoundland are commonly invaded and subsequently degraded by low shrubs, particularly *Kalmia*. *Kalmia* ties up soil nutrients and creates unfavourable conditions for establishment and growth of softwood regeneration." Man-made fires and the destruction of the forest near settlements have over the years produced many distinctive barrens, e.g., Trepassey Barrens, Witless Bay Barrens, Brigus Barrens. The remaining acidic, nutrient-poor soils not only favor *Kalmia* growth but with controlled burning produce excellent blueberry and ptarmigan grounds (Meades, 1983).

PONDS AND LAKES

Approximately 10%, or about one million hectares, of the island's surface consists of ponds and lakes, most of which are shallow, rocky, and small. Some large inland water bodies are called "ponds", and Jukes (1842) was the first to note the Newfoundland use of "pond" for "lake": "The term pond is applied indiscriminately to all pieces of freshwater, whatever may be their sizes." Prowse (1895) traced this "peculiarity of the Colony" back to Devonshire ancestry and the absence of lakes in west country England. Despite the abundance of freshwater, there is relatively little marshland, and productive waterfowl habitat is quite limited. Typical species of Newfoundland waterways include Common Loon, Common Goldeneye, Common and Red-breasted Merganser, Spotted Sandpiper, and Belted Kingfisher.

GENERAL HABITAT ASSOCIATIONS OF SOME COMMON BIRDS

Many breeding birds are widespread and generally common in suitable habitat throughout the island. Some species, however, are narrowly restricted to discrete, widely separated, habitats (e.g., Rock Ptarmigan). The Yellow-bellied Flycatcher, Boreal Chickadee, Gray Jay, Ruby-crowned Kinglet, Swainson's Thrush, American Robin, Blackpoll Warbler, Northern Waterthrush, Pine Grosbeak, Red and White-winged Crossbills, and Fox and White-throated Sparrows are usually numerous in coniferous habitats with sufficient canopy height (L. M. Tuck, 1967a; Erskine, 1977). Most of these species are major components of avian communities throughout the Nearctic boreal region, but the Yellow-bellied Flycatcher, Blackpoll Warbler, and Northern Waterthrush are among several species that are very common in Newfoundland and scarce or local on the adjacent mainland and elsewhere across the boreal zone. Where deciduous second growth dominates, as in regenerating burned- or cutover areas, Yellow and Wilson's Warblers are abundant. The Mourning Warbler is common in a wide variety of brushy and forest border habitats. The usual sparrows of open and edge habitats are the Swamp and the Lincoln's, with the Savannah Sparrow somewhat more locally abundant in drier meadows and fields. Typical birds of deciduous

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sites and mixed forest sites are the Ruffed Grouse, Downy Woodpecker, American Redstart, Black-capped Chickadee, Yellow-bellied Flycatcher, Ovenbird, and American Robin (L. M. Tuck, 1967a; Erskine, 1977).

With this general ecological background and account of the typical habitat associations of common species, we now turn attention to the history of our knowledge of the Newfoundland avifauna.

UTILIZATION OF BIRDS BY PREHISTORIC INHABITANTS

Avian abundance, distribution, and diversity change naturally through time, as well as in response to human activity and unnatural environmental perturbations. Evolutionary interpretations of natural changes require temporal perspectives that are usually only elucidated by the study of fossils. While nothing is known of the avian fossil record of Newfoundland, the starting point of the present investigation can be pushed back to well before the European settlement of North America. For about 5,000 years, much of Newfoundland's prehistory is documented by evidence left from former Indian and Eskimo occupations.

Three indigenous prehistoric, non-European peoples occupied insular Newfoundland: Maritime Archaic, Dorset Eskimo, and Beothuk or Red Indian (J. A. Tuck, 1975, 1976). The ways in which birds were integrated into these cultures will be examined, and a viking occupation, although strictly European in origin, around 1000 A.D. at L'Anse aux Meadows at the tip of the Great Northern Peninsula is also considered. Lastly, included are two North American native peoples, the Micmacs and the Montagnais or Mountaineers, who occupied insular Newfoundland after European settlement and who may have visited the island regularly before then. It is with a review of these findings that we begin.

MARITIME ARCHAIC TRADITION (CA. 3000–500 B.C.)

The Maritime Archaic culture is the earliest recorded on the island. The relics of these people have been found in many of the small inlets, bays, and river mouths along the coast, notably at Twillingate and Port au Choix. Some parts of the northeast coast were occupied just a few thousand years after the last glacial recession. The earliest traces of human activity, carbon-dated to before 7,500 years ago, come from Maritime Archaic sites unearthed at L'Anse Amour in southern Labrador on the Strait of Belle Isle (McGhee and Tuck, 1975). These natives may have inhabited Labrador as long as 9,000 years ago and Newfoundland 5,000 years ago (J. A. Tuck, 1975). The Maritime Archaic technology was well-adapted to the coastal environment; the people subsisted largely on marine mammals, birds, and fish. No trace of them after about 500 B.C. has been found.

A large sample of extremely well-preserved avian skeletal remains and artifacts have been recently excavated at a 3,000–4,000 year-old Maritime Archaic cemetery at Port au Choix on the northwestern coast of Newfoundland's Great Northern Peninsula (J. A. Tuck, 1976). This material affords extraordinary insight into the past avifauna and shows the focal importance of birds in the native culture and economy.

Bird bones deteriorate rapidly in acidic soils, and those found in prehis-

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toric archaeological digs are rarely identifiable to species. The Port au Choix cemetery, containing 53 human burials, was situated on a raised beach of fine sand and ground shell. The resulting alkaline conditions were an ideal natural preservative for skeletal material and bone artifacts.

Complete skeletons, or more often skeletal parts, such as beaks and wings, that have been found interred with aboriginal burials are typically of both archaeological and zoological significance. Such relics represent ceremonial objects and were not necessarily used as food. Most probably these birds served multiple functions for their users (Parmalee, in J. A. Tuck, 1976; Blankespoor, 1980; Gilbert, et al., 1981). However, because no village middens have been uncovered, it is not possible to determine which species selected for interment were also significant in the food economy.

Findings from prehistoric sites may at times be used for speculation about a species' former distribution and abundance (Wintemberg, 1919; Hall 1969; Gilbert, et al., 1981; see, also, Lucas, 1903). However, this information must be used cautiously as it is well documented that artifacts were often carried great distances from points of origin, perhaps via trading among neighboring groups.

Remains from at least 28 avian species (Table 1) and from many mammals (see below), including a maxilla from the extinct Newfoundland Wolf (L. M. Tuck 1947, 1979), were represented in burials. There was a marked preference for waterbirds, such as loons, gannets, cormorants, eiders, mergansers, gulls, and Great Auks and other alcids; all, with the exception of the Great Auk, are common today (Lamberton, 1976a,b; Maunder and Montevocchi, 1982; Montevocchi, et al., 1982; Appendix I). Many are still hunted. The only terrestrial birds in the burials were a few raptors, a ptarmigan, and an unidentified passerine. (The skeletal remains of any small perching birds that may have been interred would have deteriorated more rapidly than those of larger species.) Swans, especially Tundra Swans, of which there were 40 elements in the burials, must have been fairly common. There have only been two reports of this species in Newfoundland during the 19th and 20th centuries. Great Auk remains far outnumbered those of all other species, comprising 48% (237/492) of the avian elements identified to species. In one burial 200 well-preserved Great Auk upper mandibles (Fig. 7) were found, possibly the decorative remains of a feather blanket or cloak (J. A. Tuck, 1975). Many small (ca. 0.5–1.0 cm in diameter), finely polished, white, quartz-like pebbles were also found. These may have been Great Auk gizzard stones. A small quantity of similar stones collected from Funk Island by Owen Bryant are now at the Museum of Comparative Zoology, included with Bryant's message of 23 November 1908 to John Thayer “. . . came from the gizzard of the Great Auk.” We also have recently found similar pebbles among Great Auk remains on Funk Island. Red-breasted Mergansers represented in 12 burials were the most widespread species in the cemetery. These birds may have had importance as symbols of successful fish-catchers as well as having been food. *Larus* remains (probably of several species) occurred in at least

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TABLE 1. Bird remains from 3,000–4,000 year-old burials of Maritime Archaic People at Port au Choix (analyses by P. S. Parmalee, in J. A. Tuck, 1976).

SPECIES	NUMBER OF	
	BURIALS	ELEMENTS
1. Red-throated Loon	5	10
2. Common Loon	2	2
Unidentified Loon	1	6
3. *Greater Shearwater	1	2
4. Northern Gannet	4	11
5. Unidentified Cormorant	4	8
6. *Tundra Swan	6	22
*Trumpeter Swan	2	6
Unidentified Swan	5	12
7. Canada Goose	5	12
Unidentified Goose	1	3
8. *Green-winged Teal	1	1
9. Unidentified Eider	5	5
10. Harlequin Duck	2	7
11. Common Merganser	1	3
12. *Red-breasted Merganser	12	36
Unidentified Duck	1	1
13. Bald Eagle	2	12
Unidentified Eagle	3	3
14. Northern Harrier	1	1
15. Unidentified Falcon	1	1
16. Unidentified Ptarmigan	1	1
17. Unidentified Curlew	1	3
18. Hudsonian Godwit	1	2
19. Herring Gull	1	4
20. *Glaucous Gull and/or		
*Great Black-backed Gull	2	8
Unidentified Gull	12	54
21. Common or Arctic Tern	1	2
22. Common or Thick-billed Murre	4	10
23. Great Auk	8	237
24. Black Guillemot	1	4
25. Atlantic Puffin	1	1
26. Snowy Owl	1	1
Unidentified Passerine	1	1

*Probable.

15 burials. Loons, gannets, cormorants, swans, Canada Geese, eiders, and eagles were found in four or more burials.

The flightless Great Auk was also exploited by the Dorsets and Beothuks (pp. 39, 40) and perhaps by the Maritime Archaic People of Twillingate. Great Auk bones have been found in middens as far south as Florida (Hay, 1902; Fradkin, 1980), though there is little evidence that in historical times these birds bred anywhere in the western North Atlantic other than on Funk Island and on Great Bird Rock in the Magdalen Islands, Quebec (Biggar, 1924;

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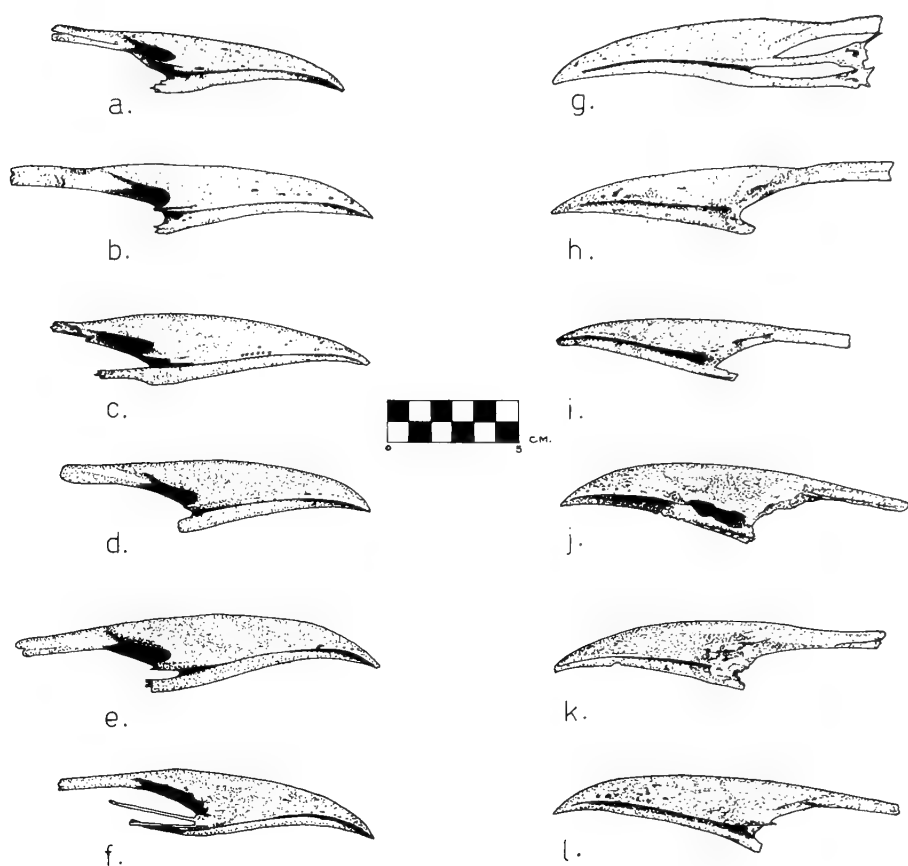


FIG. 7. A series of Great Auk upper mandibles recovered at Port au Choix (drawn by M. Tuck).

Peters and Burleigh, 1951b; L. M. Tuck, 1961; Kirkham and Montevicchi, 1982; Fig. 8). These birds were so common to the Grand Banks that they were illustrated in *The English Pilot* of 1706 as a navigational marker for European ships (Greenway, 1967; p. 52).

Great Auk remains were recently uncovered at a Dorset Eskimo midden in northern Labrador, and it was suggested (Jordan and Olson, 1982) that the recovered bones (femur and coracoids of at least two individuals) would not be included with skins, making it unlikely that the birds were obtained through trade with southerly neighbors. Salomonsen (1967) contended that winter occurrences of Great Auks in Greenland were often young birds that migrated from Newfoundland (but see Brown, 1985). Studies of Common Murres on Funk Island have shown that in August many molting adults and their flightless fledglings move northward in the cold waters of the Labrador Current, remaining off the southern Labrador coast for weeks or months

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FIG. 8. Funk Island. The dark, grassy site (indicated by arrow) marks the former nesting ground of the Great Auk. The Northern Gannet colony can be seen to the left of the grassy area, and dense nesting concentrations of Common Murres can also be seen. The shoreline in the upper left slopes gradually into the sea and was a major landing area for the flightless auks (photo: Energy, Mines & Resources Canada).

(L. M. Tuck, 1961; McLaren, et al., 1983). When migrating south in September and October, some travel through the Strait of Belle Isle. Similar movements by Great Auks (see Brown, 1985), which are also members of the alcid family, would have brought them near Port au Choix and probably made them vulnerable to aboriginal hunters. If the recovered mandibles could be aged, a preponderance of young birds in the sample would lend some credence to this speculation. Great Auks from the Magdalen Islands may also have migrated through the Strait of Belle Isle and thereby been seasonally available to natives on the Great Northern Peninsula. George Cartwright observed a Great Auk near the Gray Islands, off the eastern shore of the Northern Peninsula, on 5 August 1771, although he made only one other sighting in southern Labrador during his 16-year residence (Townsend, 1911; Brown, 1985). At a time when very few of these birds were still alive, Reeks (1869) spoke with several elderly residents who had seen Great Auks foraging along Newfoundland's west coast. Local place names on the

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west coast of the island and in southern Labrador also refer to "penguin."

The inclusion of animal parts with human burials is widespread among prehistoric groups. The beaks, heads, wings, and feet of fish-eating water-birds may have been kept as aids, while living and in the "after-life," to insure successful fishing and hunting. Such "contagious magic" beliefs usually involved the notion that the possessor of such an item would acquire the desired characteristics of the animal in question, e.g., hunting or locomotory skills (J. A. Tuck, 1976; Marshall, 1978). Raptors may have also been taken for ceremonial decoration.

Several varieties of whistles and flute-like instruments made from bird bones were found in the cemetery (Fig. 9). Three small whistles with ground ends and perforations were made from goose ulnae, and two larger ones from swan ulnae. Flute-like instruments were made from two ulnae and a radius of a swan and an eagle's ulna. We do not know whether these instruments were recreational, used as game calls, or served more esoteric purposes. Some can still be used to produce shrill sounds.

Many other bone tubes made from the radii and ulnae of swans, geese, and gulls and from the humeri of gannets and gulls also were found. High-pitched sounds can be produced by blowing across the open ends of some of these, though they probably served more utilitarian functions. Drinking tubes manufactured from bird bones have been used by Caribou Eskimos to prevent chapped lips (Birket-Smith, 1929, *in* J. A. Tuck, 1976). Newfoundlanders who used to "go to the ice" to kill Harp Seals in spring often took along similar tubes to drink from fresh water pools on the ice.

It is usually difficult and often impossible to identify specifically the altered elements of the outer wing (radius, ulna, carpometacarpus, digits). The problem is compounded when the species involved overlap in size and when the terminal ends of bones are missing. For example, three of the modified ulnae mentioned above resemble closely those of adult Trumpeter Swans; they could, however, have also belonged to exceptionally large Tundra Swans. Trumpeter Swans are believed to have bred possibly as far east in North America as Eastmain, Quebec (Godfrey, 1966). If the elements from Port au Choix are Trumpeter Swans that were killed in Newfoundland, the species migrated about 850 miles farther east than is now supposed.

Awls and needles with finely incised eyes were manufactured from bird bones. One item of sewing equipment was a case made from a Caribou metapodial which contained eight fine bird bone needles. The presence of bird bills in front of and behind the skulls of several human skeletons suggests that caps from split bird skins may have been worn (J. A. Tuck, 1976).

Bird effigies (mergansers being most commonly represented) were carved on pins, pendants, and combs (Fig. 10). These birds undoubtedly held important symbolic significance for the Maritime Archaic People (Ray, 1983). Other birds represented on artifacts include loons, gannets, cormorants, ducks, and a Great Auk.

As suggested by avian (and mammalian) recoveries, environmental con-

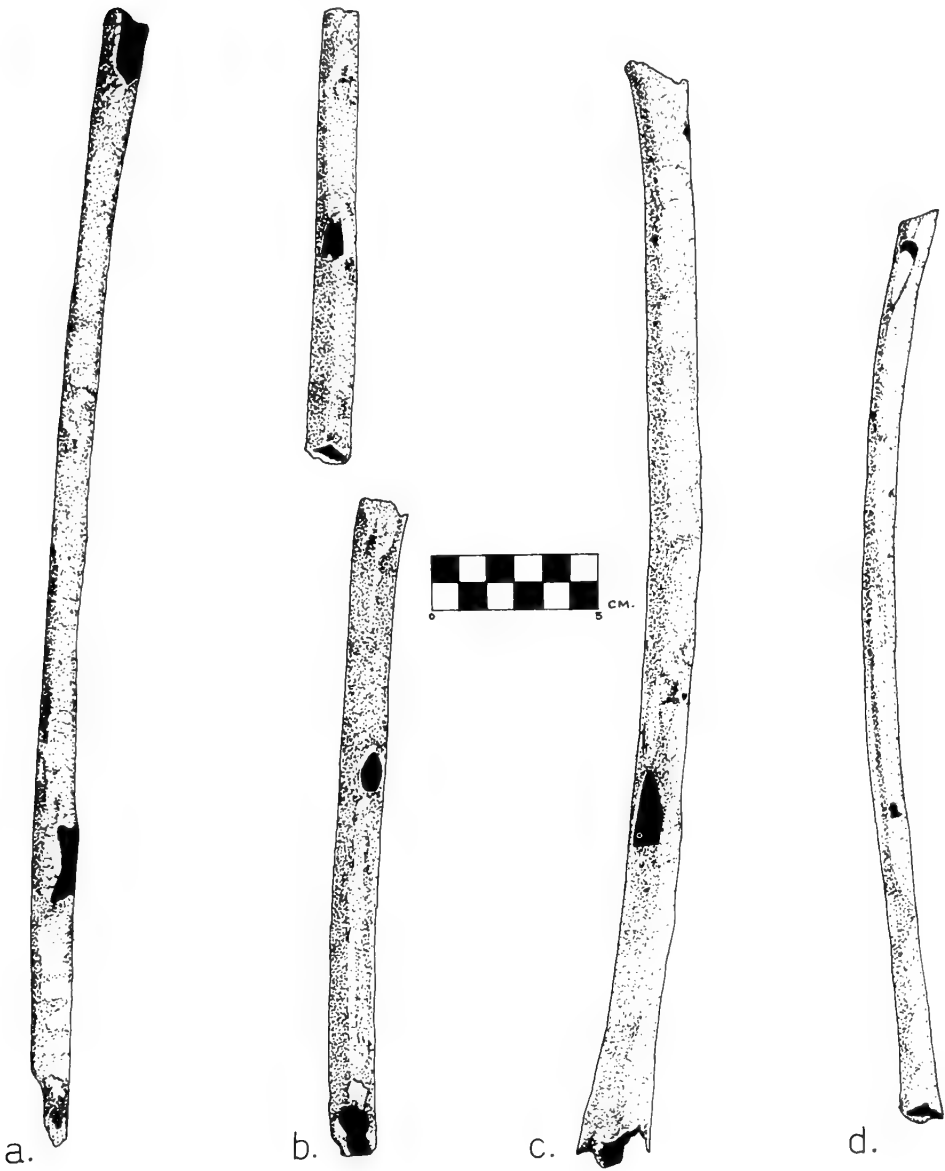


FIG. 9. Bird whistles recovered at Port au Choix in the Maritime Archaic cemetery. The instruments are made from ulnae of swans (a, b, c) and eagles (d) (drawn by M. Tuck).

ditions in Newfoundland 4,000 years ago were in many ways very similar to those of today. The climate was warmer then (J. B. Macpherson, 1981), though the difference was probably not “of sufficient magnitude to contradict faunal evidence which points to relative environmental consistency over at least the

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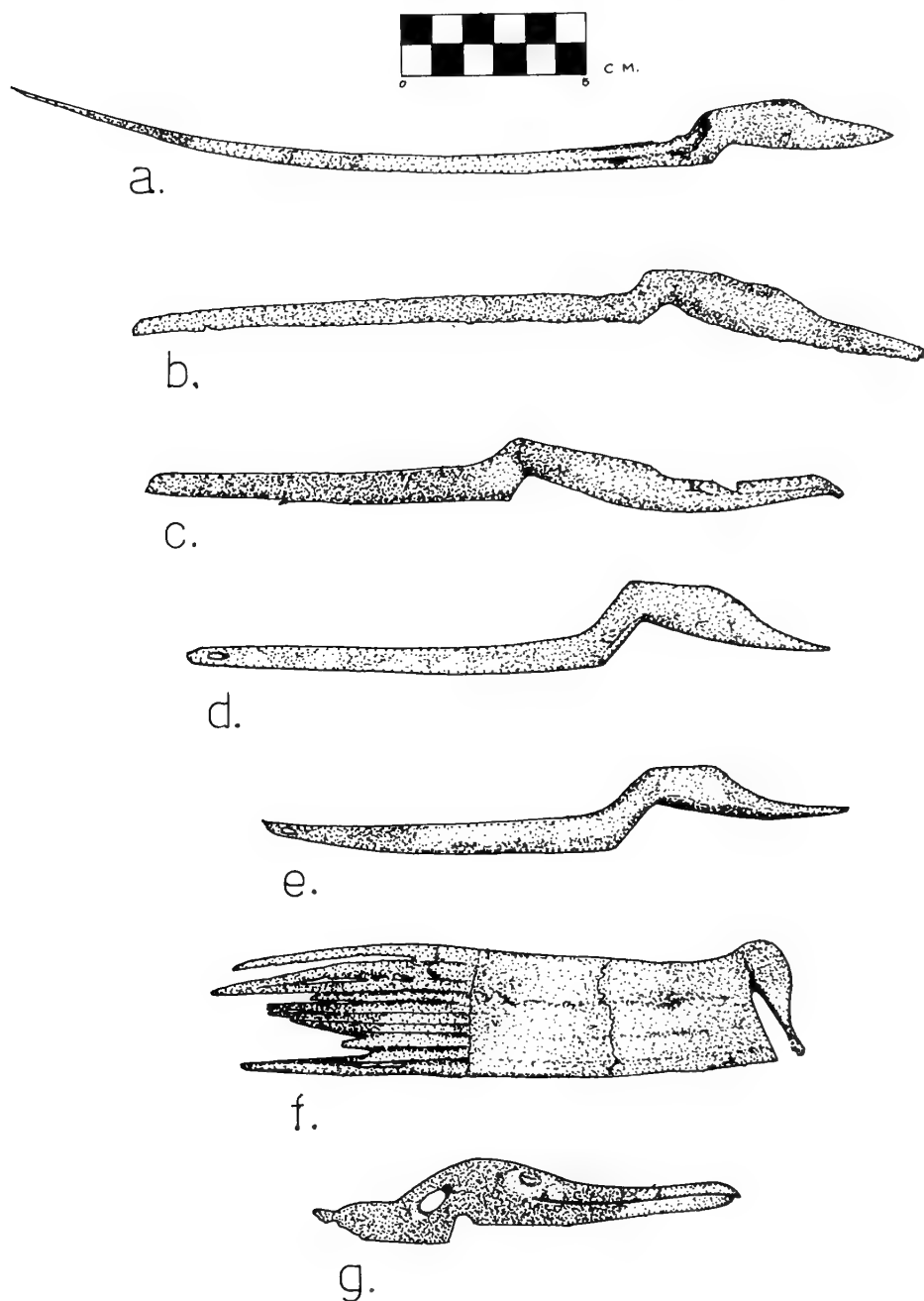


FIG. 10. Avian effigies on pins and combs uncovered at the Maritime Archaic cemetery of Port au Choix. Some are more indicative of particular species groups than others, e.g., Common Loon (a), mergansers or cormorants (hooked beaks; c and g), and mergansers (d and e). The remains of an antler comb is shown in f (drawn by M. Tuck).

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last four or five thousand years" (J. A. Tuck, 1976: 101). The Port au Choix material is carbon-dated to approximately 5,000–6,000 years after the last glacial retreat, which current studies place at 10,000–11,000 years ago (Macpherson and Macpherson 1981).

When humans first arrived in Newfoundland, it had long since separated from the mainland. It is likely that the terrestrial fauna saw few, if any, introductions or extinctions during the time of aboriginal habitation. This idea is supported by findings that many mammals evolved in isolation from their mainland progenitors to the extent that subspecific distinctions can be made (Peters, 1967; Northcott, 1974; Dodds, 1983). As with the avifauna, the mammalian remains recovered (including Black Bear, Wolf, Caribou, Beaver, Red Fox, Pine Marten, and Polar Bear) also suggest a species composition essentially the same as that in existence immediately prior to European arrival. Harp Seals were the most frequently represented mammals, as would be expected, if conditions were similar to those of today. These animals breed and pup on the pack ice off northern Newfoundland, southern Labrador, and in the Gulf of St. Lawrence. Walrus remains were also found; once common from Sable Island northward these animals have been virtually exterminated along the entire Atlantic coast.

In summary, every indication suggests that the fauna, flora, and meteorology of the Port au Choix region, and likely all of Newfoundland, have probably changed little from 5,000–6,000 years ago to the 16th century. At that time many species, and indeed the native peoples themselves, began to diminish as a result of European contacts.

DORSET ESKIMOS (CA. 1000 B.C.–500 A.D.)

Traces of Paleo-Eskimo and more recent Dorset cultures are found around the Newfoundland coast. Moving south from arctic islands, Dorset Eskimos appeared on the Labrador coast and were the next major group to inhabit the island. They lived in Newfoundland for approximately 1,500 years, starting about the time of the disappearance of the Maritime Archaic People (J. A. Tuck, 1975).

Bone refuse from Dorset sites has consisted largely of Harp Seals, and though seabird remnants have also been found, they are usually too fragmentary to identify. Recent finds from northern Labrador show that the Dorsets depended on seabirds as well as marine mammals (Cox and Spiess, 1980; Jordan and Olson, 1982). Approximately 1,300 avian elements from these sites are about evenly divided among the Laridae (large gulls including Great Black-backed Gull and Glaucous Gull), Merginae (diving ducks, including *Melanitta* spp. and *Somateria* spp.), Procellariidae (Northern Fulmar and shearwater (*Puffinus* spp.)) and Alcidae (Black Guillemot, murre (*Uria* spp.)). There are also a few fragments of geese, ptarmigan, small gulls, Great Auk, Dovekie, and Common Raven (Cox 1978; Cox and Spiess, 1980; Jordan and Olson, 1982). A layer of feathers found on the floor of an old

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shelter was probably the remains of a feather mat (Cox and Spiess, 1980). Until 1939, when the practice was outlawed, Greenland Eskimos produced blankets of eider down and skins, a beautiful example of which is housed at the Museum of Comparative Zoology at Harvard University. Like the Maritime Archaic People and the Beothuks, the Dorsets manufactured bone pendants that were decorated with the images of marine mammals and sea-birds (Marshall, 1978; Ray, 1983).

The Dorsets bore no resemblance to the Maritime Archaic People. The reason for their disappearance from Newfoundland is unknown (J. A. Tuck, 1975; Cox, 1978).

BEOTHUKS OR RED INDIANS (CA. 500–1829 A.D.)

The Beothuks occupied Newfoundland during historic times and were the first North American natives encountered by Europeans. They were probably present at least during the later stages of Dorset occupation. Evidence suggests a possible line of descent from the Maritime Archaic People. What little is known of their language suggests linguistic affinity with the Algonkian complex, which includes the languages of the Naskapi of Labrador, the Micmacs of the Maritimes, and those of other northeastern North American Indians (Howley, 1915; J. A. Tuck, 1975; Carignan, 1975; Hewson, 1978).

The Beothuks led a partially nomadic existence and in winter camped in the interior of the island on Red Indian Lake. Each summer they made their way via the Exploits River to the northeast coast from Cape St. John to Cape Freels, where they caught salmon and seabirds (Howley, 1915; Carignan, 1975; F. W. Rowe, 1977). In the autumn they began their inland trek. They built many miles of deer fences along the Exploits River to interrupt the migration of caribou, the mainstay of their winter diet, and to direct them through openings where hunters laid in waiting (Jukes, 1842; Howley, 1915; F. W. Rowe, 1977). These seasonal living arrangements and movements are not unlike those suggested for the Maritime Archaic People (see above).

Persecution by some fishermen and early settlers on the northeast coast had by the late 18th century cut the Beothuks off from the sea and their exploitation of marine resources. The natives were also harassed by the Micmacs who had acquired firearms from the French (Lloyd, 1875; Howley, 1915; F. W. Rowe, 1977; Bartels, 1979). Subsequently, there was an extended period of apparent starvation as well as an outbreak of European disease (tuberculosis). Realizing their ultimate plight, Captain George Cartwright (see p. 54) had suggested to a government committee in 1793 that a portion of Notre Dame Bay be set aside as a Beothuk hunting and fishing reserve (F. W. Rowe, 1977), but these Indians became extinct early in the 19th century (Howley, 1915; Carignan, 1975; F. W. Rowe, 1977).

From 5 September to 2 November 1822, William Epps Cormack accompanied by Joseph Sylvester, a Micmac guide, walked across Newfoundland from Trinity Bay to St. George's Bay on the southwest coast, in an attempt

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to make contact with Red Indians. Cormack mapped the route, naming geographic sites on the way, including Mt. Sylvester in central Newfoundland (see p. 71). No aborigines were encountered, though the venture was doomed to failure, because Sylvester guided Cormack well south of Red Indian Lake through Micmac country (F. W. Rowe, 1977).

The last known surviving Beothuk, a young woman named Shawnawdithit (Howley, 1915; F. W. Rowe, 1977), was brought to St. John's in 1828. She spent a few months at Cormack's home, where he worked with her to record much of what is now known of the Beothuks' history, culture, and language. At about 30 year of age Shawnawdithit died of tuberculous in St. John's in 1829. With her death the first North American natives contacted by Europeans fell to extinction.

What little is known of the Beothuk language reflects their knowledge of birds (Table 2). Shawnawdithit's word for eider duck islands (*Mammasheek*) suggests that these birds nested (probably abundantly) in her lifetime on low-lying islands on the northeast coast (Bay of Exploits, and Notre Dame and Bonavista Bays). There are only relic nesting pairs of Common Eiders in these areas now, as the breeding stock was decimated in recent times (Reeks, 1869; Townsend, 1914; L. M. Tuck, 1967a). Shawnawdithit mentioned words

TABLE 2. Beothuk bird names and terms (adapted from Howley, 1915 and Hewson, 1978).

BEOTHUK WORD	TRANSLATION/PROBABLE SPECIES
Abobidress or Ewinion	Feathers
Aoujet	Common Snipe
Asson	Seagull
Boodowit	Duck
Bobbidist	Black Guillemot
Debine	Egg
Deynyad	Bird
Ejeedoweshin	Fowl
Geonet	Murre
Gobidin	Bald Eagle
Gotheyet	Black-legged Kittiwake
Guashawit	Atlantic Puffin
Mameshet	Common Eider
Mammadronitah	Harlequin Duck
Mammasheek	Eider islands
Meoth	Flying
Obseet or Ounernish	Little bird
Odensook or Yewone	Canada Goose
Osthuk	Razorbill
Popadish	Large bird
Sheebuint	Woodpecker
Sugumith	Bird's excrement
Woodch	American Robin
Zosoot or Susut	Ptarmigan

for all the alcids that breed in Newfoundland except the Great Auk, which was extinct or very nearly so when she was born (Kirkham and Montevecchi, 1982). The Great Auks, like the Beothuks, were abused by some early settlers, and the birds and natives became extinct at about the same time. Shawnaudithit also did not mention the Northern Gannet, a common bird during summer off the northeast coast today, but which might have been extirpated from Funk Island about the same time as the Great Auk (Gilliard, 1937; L. M. Tuck, 1961; Montevecchi, et al., 1980; Kirkham and Montevecchi, 1982; see p. 145).

The Beothuks hunted birds extensively and manufactured pointed and bulbous arrows for large and small birds, respectively (Howley, 1915; cf. the extremely limited representation of small birds uncovered in the Maritime Archaic cemetery, Table 1). Marine birds and eggs were important components of summer diet, and in times of want jays were reported to have been eaten (Howley, 1915; see p. 46). Analysis of the vertebrate material at a 17th century Beothuk occupation site at Boyd's Cove, Notre Dame Bay, revealed that a third of the remains were avian (Cumbaa, 1984, *in* Pastore, 1985). Waterbirds predominated with Canada Goose being by far the most commonly recovered species, followed by cormorants and other waterfowl. Avian material was also used for adornment; John Guy noted that the Beothuks' long hair was plaited with feathers (F. W. Rowe, 1977).

Tethered Canada Geese and Black Guillemots were used as decoys, and the down of Blue Jays was reportedly used as tinder (Howley, 1915). Lieutenant John Cartwright, who led an expedition in 1768 in an attempt to establish friendly contacts with the Red Indians, noted that their arrows were feathered with "Grey goose wing" (probably Canada Goose) and "gripp" (i.e. Bald Eagle) (Lloyd, 1875: 29).

In summer the Beothuks occupied the Cape Freels region (Carignan, 1975), the nearest point of land to Funk Island. There are numerous early references to their collecting eggs and seabirds on Funk Island, where they apparently made one or two visits each summer (Banks, 1766, *in* Lysaght, 1971; Cartwright, 1792; Anspach, 1819). In a ravine on Funk Island, traditionally referred to as Indian Gulch, Lloyd (1875) recorded that a Beothuk canoe paddle and arrowheads had been found. They undoubtedly exploited seabird resources from the nearby Wadham and Penguin Islands as well. Great Auk eggs were much larger than those of other seabirds and obtainable in large quantities on Funk Island; it is likely that egg collecting was the main reason for the Beothuks making the long, treacherous canoe trip there. The voyage to Funk Island, a small (ca. 400 × 800 m), low-lying granite rock situated approximately 60 km offshore is remarkable. It is only visible from a few miles on a clear day and from a few meters when fog enshrouds it. The surrounding sea can be violent, and even in calm conditions a safe landing can prove very difficult (Russell, 1965; see Fig. 11). How the Beothuks learned of and navigated to Funk Island is a mystery. Perhaps it was discovered in the spring, if they ventured to the pack ice to hunt Harp Seals.

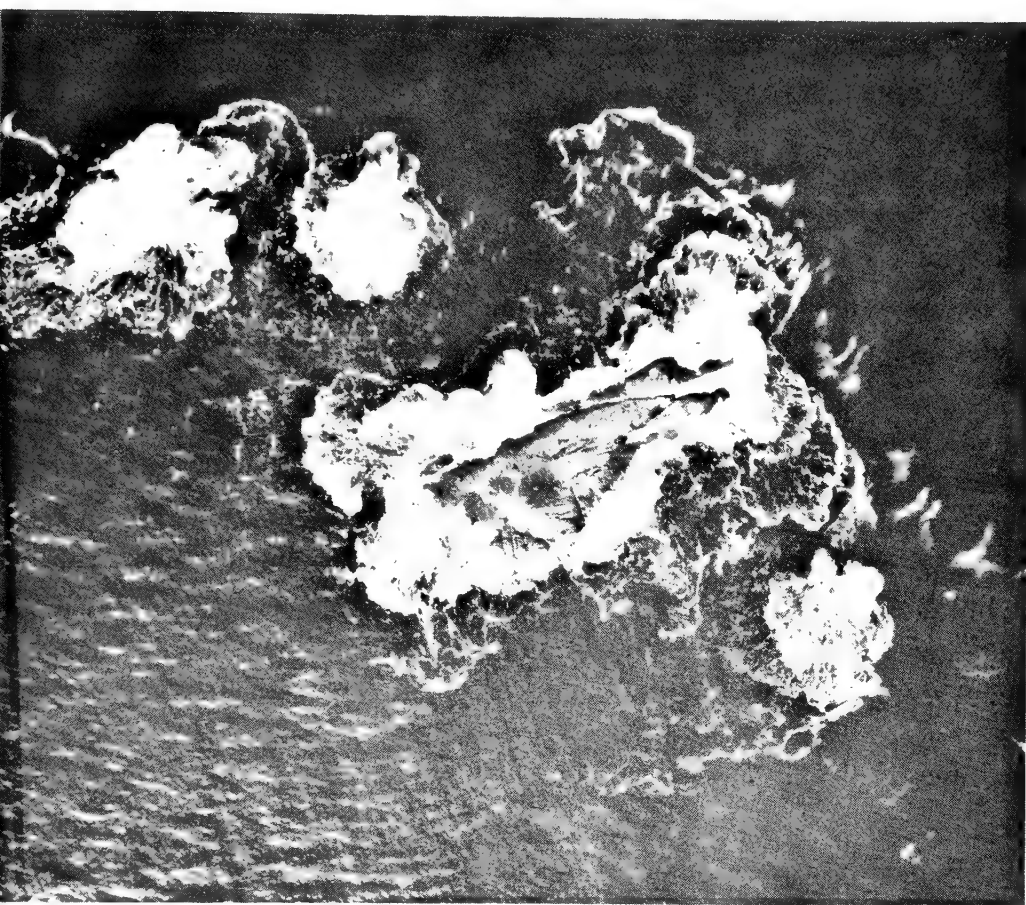


FIG. 11. Rough seas crashing on Funk Island. The cove at the northeastern tip of the island is Indian Gulch (photo: Energy, Mines & Resources Canada).

Whitbourne (1622) describes a Beothuk camp site and how birds and egg yolks were boiled by dropping hot rocks into bark pots. He also noted birch buckets filled with “. . . the yolks of eggs, that they had taken and boiled hard, and so dried small, which the savages used in their broth.” This rich source of fat and protein apparently preserved well, as containers of dried yolks were found in winter camps (*mamateeks*). Joseph Banks (1766, *in* Howley, 1915: 28) referred to their puddings made of eggs and deer hair and wrote, “They are said to fetch eggs for this consumption as far as Funk or Penguin Island, ten leagues from the nearest land.” John and George Cartwright both reported that dried yolks were also used with seal fat and liver, in a kind of sausage or pudding stuffed into seal intestines (Lloyd, 1875; Howley, 1915).

The last account of Beothuks at Funk Island was by Captain G. C. Pulling,

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who prepared a report, probably for the Newfoundland Governor, on the relations between the natives and the fishermen and furriers on the northeast coast (F. W. Rowe, 1977). Maurice Kennedy told Pulling that on 30 July 1792, John McDonald of Tilton Harbor and four others landed on Funk to collect eggs. When they saw two canoes of "savages" approaching, McDonald claimed to have fired into them, after which the Indians paddled toward the Wadhams (Pulling, 1792).

VIKINGS AT L'ANSE AUX MEADOWS (CA. 1000 A.D.)

The only known Viking visit to Newfoundland (known as Vinland or grassland) occurred around 1000 A.D. (Ingstad, 1966). At L'Anse aux Meadows, on the Great Northern Peninsula, the walls of seven Viking structures have been excavated (Ingstad, 1969), and some of the buildings have been reconstructed. The Vikings never achieved permanent settlement, and it is not known how long they stayed or why they left or disappeared. According to Norse sagas, the Vikings traded and fought pitched battles with Vinland natives called "Skraelings." The speculation that the Beothuks were the "Skraelings" referred to in the sagas (Ingstad, 1966) is unfounded (McGhee, 1982).

The Vikings raised domestic animals (cattle, horses, sheep), hunted, and fished (Ingstad, 1977). Seabirds, especially Great Auks, were hunted extensively (Greenway, 1967; Ingstad, 1977). However, had there been any Great Auk or other avian material at L'Anse aux Meadows, it probably was destroyed by the thick overburden of peat, as no bones have been found. In general, very few animal remains have been uncovered at Viking sites, as, for example, at the many refuse heaps that have been searched on Norse farms in Greenland. Unlike Eskimos, the Norse may have discarded offal in the sea or their untethered dogs may have eaten and carried it off (Greenway, 1967). Species that have been found and identified in Norse sites in Greenland are Whooper Swan, Thick-billed Murre, Rock Ptarmigan, and Gyrfalcon (Greenway, 1967). Presumably similar species were taken in Newfoundland. Ingstad (1966) speculated that Norse Greenlanders constructed small stone shelters to attract nesting eider ducks and probably took their eggs and down (Fig. 12). These types of shelters are still used in parts of Norway today (e.g., at Røst). None as yet have been identified in Newfoundland.

NATIVES PRESENT DURING HISTORIC TIMES: MICMACS AND MONTAGNAIS (CA. 1600–PRESENT)

More recent non-European residents on the Island were the Montagnais (or Mountaineers) and Micmacs. The latter people still reside in Bay D'Espoir, St. George's Bay, and Badger, though they have mostly abandoned aboriginal ways. There is no prehistoric evidence of Micmac settlement on

UTILIZATION OF BIRDS BY PREHISTORIC INHABITANTS

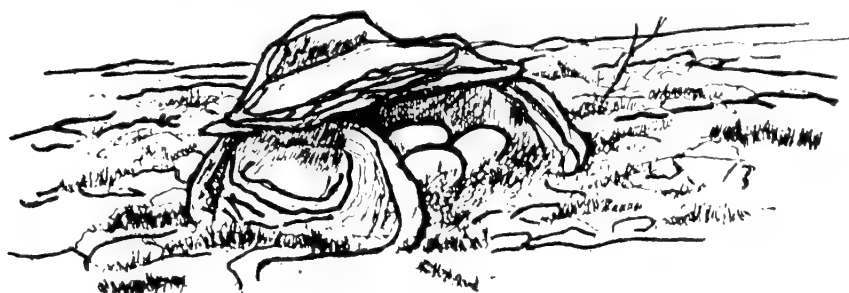


FIG. 12. Eider nesting shelters of the type that may have been used by Norse in Greenland to attract breeding birds (from Ingstad, 1966).

the island, though Micmacs very likely crossed the Cabot Strait from Cape Breton before Europeans arrived. Newfoundland may have been part of their traditional hunting, trapping, and fishing territory (Bartels, 1979). They apparently did not begin to settle in Newfoundland in any numbers until the French settlement of Nova Scotia and Cape Breton, just after 1600 (Harp, 1964). The acquisition of sailing shallops and firearms contributed to their migration to Newfoundland, which probably peaked in the mid- to late 17th century.

The Micmacs were expert trappers and worked the interior of the island. They were reported to use a salve of egg yolk and turpentine on cuts (Cormack, 1823). They possessed a noted facility for learning bird songs (Wallis and Wallis, 1955), and Cormack (1823; see, also, p. 71) wrote that they ". . . had a call or toll for every kind of beast and bird." Jukes's (1842; also, see p. 74) Micmac guide, Sulleon, an expert woodsman and hunter, called black ducks to within shooting range. Sulleon also prevented some of his party from shooting a jay because of his belief that such an act would ruin the gun (Jukes, 1842). The Micmacs held many superstitions about birds and believed that disturbing a bird's nest would bring bad luck (Wallis and Wallis, 1955).

Montagnais began to visit the island from the Labrador region around the end of the 17th century. They hunted in Newfoundland in historical times and were reportedly friendly with the Beothuks (Jukes, 1842; Howley, 1915; Harp, 1951). Although they seem to have been fairly frequent visitors, especially in winter, they are not known to have settled permanently on the island.

The Montagnais had extensive knowledge of birds. According to George Cartwright, they too were adept at imitating bird calls to lure prey. Harper (1964: 84–85) has documented many Montagnais bird names. A number of them are onomatopoeic, e.g., *Pitski kiki* for Boreal Chickadee. The morning calling of the Common Loon was believed to forecast a windy day (Harper, 1964). Like the Micmacs and many other North American native people,

UTILIZATION OF BIRDS BY PREHISTORIC INHABITANTS

with the possible exception of the Beothuks, the Montagnais also had taboos about killing a Gray Jay (*Oiskitshan*), because of the misfortune it was believed to bring. Jays ensnared in traps were discarded, and it was also considered a bad omen to find a Gray Jay nest (Harper, 1964). Trapping was an important winter activity, and in spring the Montagnais spent considerable time collecting eider ducks and eggs along the coast; the meat was dried and smoked (Townsend, 1914).

We have seen in this chapter that the native people of Newfoundland, like those elsewhere, utilized birds in a variety of ways. In doing so they accumulated some of the earliest avifaunal knowledge in North America. Most of this knowledge, especially that acquired in prehistoric times, has been lost forever. Something, however, can be learned about species occurrence, distribution, and abundance by careful study of native cultural remains. This information provides a flashback glimpse of the birds present in the distant and recent past. Overall, it appears that the avifauna of insular Newfoundland prior to European incursion was similar to that present today.

EARLY WRITTEN ACCOUNTS OF BIRDS (1007–1795 A.D.)

Written records of North American birds first began in Newfoundland when early European explorers penned accounts of the “newly discovered” continent’s wildlife. This early information yields a view of the avifauna of past centuries, and of the first European interest with and relationship to it.

Early voyagers to the New World encountered a virtually unexploited land and sea that teemed with life. The most immediate concern upon reaching landfall in the western North Atlantic was the replenishment of depleted fresh food. Consequently, Newfoundland’s major seabird communities became the first North American “fast food take outs.” From the time of their first discovery through the 19th century, the unabated exploitation of colonial marine birds escalated out of proportion to what most of the populations could sustain. The present chapter surveys the initial written accounts of North American birds by explorers and colonizers, as well as the early natural history findings of the 18th century.

NORSE SAGA OF KARLSEFNI (1007 A.D.)

The first avian record for Newfoundland is contained in Karlsefni’s Saga, dated 1007. Eider ducks are mentioned as nesting so close together on off-shore islands near Vinland that it was difficult to walk about without breaking eggs (Peters and Burleigh, 1951b; Ingstad, 1966). Although eiders previously nested abundantly on islands along Newfoundland’s north shore, hunting and eggging activities during the breeding season have led to the near-demise of the population (see p. 41), and very few nest in the area today.

SIXTEENTH CENTURY EXPLORATION

Sailing in small ships to unknown or largely unexplored lands, early explorers were always concerned about food supplies. Crossing from Europe to the New World often took two months or longer, and meats for the trip were heavily salted for preservation. The success of these voyages often depended on additional fresh food being obtained enroute. Naturally, wild animals found in this “newly discovered” region figured prominently in early accounts. Nearly all reports of birds were of large colonial seabirds that were used as food (see Chap. 9). Moreover, early mariners used marine birds as valuable navigational and landfall indicators (Anspach, 1819; Bonnycastle, 1842; Prowse, 1895; L. M. Tuck, 1961; Brown, 1980; also, see p. 52).

Giovanni Caboto’s (John Cabot) “discovery” of the Island of St. John (1497–98).—The absence of written accounts of Caboto’s voyages to the New World is striking. Hakluyt (1589–1600), fortunately, translated a Latin inscription from

a map, engraved by Clement Adams in 1549. The map was drawn by Caboto's son, Sebastiano, who had accompanied his father on both voyages. The information relates to the 1497 discovery of Newfoundland, referred to as the Island of St. John, supposedly because it was first sighted on 24 June, the feast day of John the Baptist (Hakluyt, 1589–1600). It is still a contentious issue about where Caboto first landed. Most historians favor Cape Bonavista, while others favor Cape Breton (Nova Scotia). Interestingly, the inscription also refers to an abundance of fish called "baccalos" by the natives. Many later historians (Anspach, 1819; Bonnycastle, 1842; Prowse, 1895; Laird, 1980) contend that Caboto referred to Newfoundland as the Isle of Bacalao, a name considered to be the natives' term for the island. The name is of Basque origin and is derived from the word for codfish (*bacalhao*) (Prowse, 1895; Seary, 1971; see p. 50 and Fig. 2). Hatton and Harvey (1883) speculate that Caboto used the Beothuk word for Newfoundland (*bobboojoret*) and that the Basque one was applied later. It seems likely that Sebastiano Caboto simply used the Basque name that was probably applied between the time that his father "discovered" Newfoundland and the time that Sebastiano wrote his account (Barkham, 1982; Nettleship and Evans, 1985). Two large islands on Newfoundland's northeast coast, Bacalhao and Baccalieu (Chap. 9), retain place names derived from Basque influence. There are numerous claims that Basques and perhaps other Europeans were fishing and whaling in Newfoundland and Labrador waters well before Caboto set sail for the New World (Bailey, 1969; Laird, 1980). None can be substantiated (Barkham, 1982; see p. 50).

A portion of the inscription on Sebastiano Caboto's map reads, ". . . In the same Island also, breed hawks, so black in their color that they wonderfully resemble ravens; besides there are partridges, and eagles of dark plumage." On the basis of this account one might speculate about sightings of dark phase Rough-legged Hawks and immature Bald Eagles. In 1768 John Cartwright noted that ptarmigan were still erroneously called partridges in Newfoundland (Howley, 1915), as they are today (Appendix II).

Gaspar de Cortereal (1500–01) and Y. dos Aves (Island of Birds).—In 1500 Cortereal visited Newfoundland and returned to Portugal with a large number of unidentified native people, probably Beothuks, to be used as slaves. The next year he made a second voyage from which he never returned. His brother Miguel set out with two ships in 1503 in search of Gaspar but he too was never heard from again.

Although these expeditions provided no direct information on the avifauna, Gaspar de Cortereal was probably the first European explorer to discover Funk Island. A map prepared by the cartographer Pedro Rinel, provisionally dated around 1503 but which may have been drawn after 1520 (Morison, 1971; Nettleship and Evans, 1985), shows an *Y.-dos-Aves* or "Island of Birds" near the actual location of Funk Island (Harrisse, 1900).

Falconry, a noble's sport: British Parliament seeks New World falcons (1503).—On 17 November 1503 the British Parliament voted to provide a reward “. . . to one that brought haukes from New Founde Island.” Falconry, a sport in which trained hawks hunt smaller birds, was widely practiced in the Old World, particularly by the nobility (Fuertes, 1920). Gyrfalcons, for instance, could only be owned by royalty. Female Peregrine Falcons may have been the preferred species of falconers (McAtee, 1957). Falconry is still widely practiced today, especially in Arabian countries of the Near East.

Jacques Cartier's North American voyages (1534–35): fresh meat from Funk Island.—Historians, geographers, and ornithologists alike are fortunate to have access to the carefully detailed accounts of Jacques Cartier's North American voyages. His written descriptions (Biggar, 1924) truly stand out from those bare-boned, often inaccurate, accounts which were the vogue of New World explorers. On 20 April 1534 Cartier set out from St. Malo and arrived on the Newfoundland coast at the harbor of St. Catherine (now Catalina) on 10 May (Howley, 1915). Following ten days of refit he sailed northward to L'Isle des Ouiaseaulx, Funk Island, where fresh eggs and birds were taken. Cartier documented an abundance of Great Auks, noting in his log “In less than halfe an houre we filled two boats full of them, as if they have bene stones, so that besides them which we did eat fresh, every ship did powder and salt five or sixe barrells full of them” (Hakluyt, 1660, in Biggar, 1924). He also recorded the presence of Northern Gannets and Common Murres on Funk Island (L. M. Tuck, 1961; Kirkham and Montevecchi, 1982; see p. 145). On a second voyage to North America in 1535, Cartier's first stop was at Funk Island, where Great Auks were taken to replenish fresh meat supplies before proceeding to Labrador.

First North American tourist cruise: Hore expedition to Newfoundland (1536).—Mr. Richard Hore, a leather merchant of London, chartered the *Minion* and the *Trinity* to make a fishing venture and tourist cruise for English gentlemen to Newfoundland (Hakluyt, 1589–1600; Morison, 1971). Around late June/early July 1536 the expedition landed at “Penguin Island” (Hakluyt, 1589–1600; Howley, 1915; Biggar, 1924). There are Penguin Islands situated off Cape La Hune on the south coast and near Musgrave Harbour on the northeast coast (Fig. 2). However, as noted in the ship's log the island's latitude was about 50° N, hence either Funk Island (49° 46'N, 53° 51'W) or the Penguin Islands (49° 27'N, 53° 48'W) on the northeast coast were the likely landing sites (Biggar, 1924). They found the island “full of great foules white and gray, as bigge as geese, and . . . infinite numbers of their eggs” (Biggar, 1924: 274). They dressed and ate the birds and found them “good and nourishing meat.” Howley (1915) speculates that this account refers to Great Auks.

After leaving Funk Island, the group's provisions ran out. Stranded on the Newfoundland coast some of the tourists starved to death, while others

were reportedly cannibalized. The gory details of this venture brought the New World tourist business to a close for at least two centuries (Morison, 1971).

An early Basque account.—The Basques were fishing in Newfoundland and Labrador waters in the 16th century (Barkham, 1982), and some of their writings about seabirds are both interesting and informative. The following account that relates to New World fishing was written by Pierre Detchevery Dorre in 1677 and was an expansion of an earlier French report by Martin Hoyarsabal in 1579.

Know that when you approach closer to land, about 100 leagues, you will find large black birds that are not able to fly and the Basques call them *Dukes*. When you see them you warn yourself and make sure you give a warning to your crew.

Know that when you approach the banks you will see many white birds, called *pigeons* by the Basques, and near them you will normally see some black birds with long beaks and white stomachs—and you can observe that you are on the edge of the banks . . .

Know that when you are approaching land you will find groups of *Potorros*, 8 or 10 or 12 or more . . . and watch out for land.

Know that if you see some large white birds bigger than *Marloinnas* and with long necks, which the Basques call *Gorrac*, and likewise certain black birds which have red legs, and which are called in Basque *Chucutun Choriac* . . . you will not be very far from land.

(Contribution and translation by S. Barkham)

This account yields a fascinating overview of the foraging sites and ranges of many seabirds. The *Dukes* are Great Auks (see p. 52), and the pigeons refer presumably to kittiwakes and/or fulmars that occur on the Grand Banks in large numbers. The black birds with long beaks and white stomachs that occur on the edge of the banks could have referred to Greater Shearwaters or possibly murrelets. *Potorros* may refer to puffins that often forage closer to shore than larger alcids. The large white birds with long necks, which the Basques called *Gorrac*, must be gannets, and the black birds with red legs (*Chucutun Choriac*) are Black Guillemots, which indeed tend not to venture very far from the coast.

The colonizer, Sir Humphrey Gilbert (1583).—During Gilbert's ill-fated voyage in 1583, when Newfoundland was claimed as Britain's first colony, Captain Edward Hayes, the historian, recorded birds

. . . as bigge as Bustards, yet not the same. A great white foule called of some a Gaunt. [Bustards and gaunts are old British terms for geese and gannets, respectively (Bonnycastle, 1842; McAtee, 1957; Nelson, 1978).] Upon the land divers sorts of haukes, and faulcons, and others by report: Partridges most plentiful larger than ours, gray and white

EARLY WRITTEN ACCOUNTS OF BIRDS (1007–1795 A.D.)

of colour, and rough footed like doves, which our men after one flight did kill with cudgel, they were so fat and unable to flie. Birds some like blackbirds [American Robins (Jukes, 1842; McAtee, 1957)], linnets [Purple Finches (Sclater ca. 1920; McAtee, 1957) or Common Redpolls], canary birds [Yellow Warblers, Wilson's Warblers (Lysaght, 1971)] and others very small.

Corroborating this report of the ptarmigan's tameness John Cartwright wrote in 1768 that partridges

. . . do not seek the warm woody vales until the snow and wintry blasts drive them off the open barrens where they are bred. They become in cold weather so tame as to appear deficient of self-preservation; so that they are killed at pleasure, and may be almost reckoned as a kind of poultry to the Indians (Howley, 1915: 40).

Banks (1766, *in* Lysaght, 1971) and Jukes (1842) also commented on the ptarmigans' tameness.

In another account of Gilbert's visit, Sir George Peckham (1583) wrote that they found plenty of game birds, such as "partridge and swans" (cf. the abundance of swans suggested by the remains unearthed at the Maritime Archaic site in Port au Choix, p. 00) and also listed "hawkes, bitters [?American Bitterns], curlewes, herons, cranes, mallards, Wildgeese, stockdoves, margaus [gannets], blackbirds [robins], parrots [?puffins], Pengwyns [Great Auks]." Sir Humphrey also visited Funk Island where his crew took a good supply of seabirds, some of which they salted for later use (Anspach, 1819; Lucas, 1890).

Rice Jones (1594).—During a voyage to the Gulf of St. Lawrence in 1594, Rice Jones encountered a deserted Indian camp in St. George's Bay. Here among other things were found "foules called cormorants which they had pluckt and made ready to have dressed . . ." (Howley, 1915: 12). Great Cormorants nest on rocky cliffs near the mouth of St. George's Bay today.

SEVENTEENTH CENTURY COLONIZATION

During the 17th century permanent fishing communities began to flourish on the Newfoundland coast. Many colonial seabirds were subjected to intense exploitation for food, oil, bait, and feathers (Collins, 1882; L. M. Tuck 1961; Mowat, 1984). Colonization also changed the landbird habitat through the clearing of land around coastal settlements, but this process was a much slower one.

Captain Richard Whitbourne (1578–1620), a Newfoundland public relations man.—Having made his first voyage to Newfoundland in 1578, and many thereafter, Whitbourne went to great length to promote British settlement in Newfoundland. His efforts culminated in the publication of *A Discourse*

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and Discovery of New-found-land (1622). Bearing in mind that he reported a mermaid in St. John's Harbour (Laird, 1980), Whitbourne also mentioned goose, godwit, curlew, partridge, gripe (eagle), lark, crow, raven, fillady (?chickadee, *Parus* spp.), thrussel (?robin), thrush nightingale (Hermit Thrush), sparrow, and bulfinch (McAtee, 1957; A. G. Macpherson, 1981; Story, et al., 1982). An "infinite" abundance of Great Auks on Funk Island was reported, and it was noted that they could be driven by the "hundreds" down gang-planks into waiting boats. Whitbourne felt that Divine Providence surely must have provided these easily obtainable creatures for the benefit and sustenance of man, and so it was for about another 150 years (L. M. Tuck, 1961; Kirkham and Montevecchi, 1982; Chap. 9).

Governor John Mason (1620).—The second Governor of Newfoundland (1614–17), Mason wrote *A Briefe Discourse of the Newfoundland* (1620). In this book he noted teal, sea pigeons (Black Guillemot), Common Snipe, twillocks (Greater Yellowlegs), Ospreys, great and lesser owls, swallows, jays, Phillidas (?chickadees), wrens, and blackbirds with red breasts (robins) (A. G. Macpherson, 1981; Story, et al., 1982).

Governor Nicholas Denys (1672), a French natural historian.—During the mid-17th century Denys was Governor of New France, which centered on Acadia and for a short period included much of the northeastern North American coast and Newfoundland. His book, *The Description and Natural History of the Coast of North America* (1672), was the first to address the continent's natural history in detail. Denys included some interesting information on North American birds and other fauna and flora. He provided an account of sea-birds on the Grand Banks, where there were great abundances of fulmars, petrels, guillemots (murre), and Great Auks (p. 000). He noted that Great Auk chicks rode on the backs of their parents, a behavior that is prominent in many local traditions about alcids, but one that has never been substantiated.

EIGHTEENTH CENTURY NATURAL HISTORY DOCUMENTATION

With the exception of Denys, no previous writer had concerned himself exclusively with natural history. After a century of exploration followed by another of coastal settlement, reliable nature study began in earnest in the 1700s. It is from these detailed efforts that we have derived much knowledge about the birds of Newfoundland 200–300 years ago.

The English Pilot (1706), Great Auks mark the Grand Banks.—Besides being exploited for food and other utilitarian purposes, the presence of seabirds, and their seasonal movements, provided mariners with important navigational information. The presence of marine birds often indicated approaching landfall or fishing banks at sea (Anspach, 1819; Bonnycastle, 1842; Milne, 1875; Prowse, 1895; L. M. Tuck, 1961; Brown, 1980). Crude drawings of Great Auks ("Penguins") appear in the 1706 edition of *The English Pilot* that

describes North American navigation (Greenway, 1967; Shaw, 1940; Lysaght, 1971; Fig. 13). The birds were reported to be abundant and so restricted in their distribution that they were reliable indicators of the Grand Banks. This sort of mariners' lore affords tantalizing insight into the Great Auks' pelagic distribution (Brown, 1980, 1985; Olson, et al., 1979). Their use of the Grand Banks as a foraging area is similar to the present-day patterns exhibited by other Atlantic alcids, such as razorbills and murres (L. M. Tuck, 1961; Brown, 1985, 1986). Note was also made that Great Auks tended to group at sea, "several of them together, sometimes more, other times less, but never less than two together" (Shaw, 1940:113; Greenway, 1967:275; Lysaght, 1971:168), suggesting that they were as gregarious at sea as are other alcids.

Albin's Great Sea Diver from Newfoundland (1738).—Many birds were brought back to Europe from Newfoundland in the 16th and 17th centuries (Mackie, 1966), yet it is not until 1738 that a definite record of a Newfoundland bird taken to England can be documented (Lysaght, 1971). Albin's (1738) *A Natural History of Birds . . .*, a loose, unsystematic work (Allen, 1951), contains a plate and description of a Great Sea Diver (Common Loon) "from Newfoundland." A collection of Newfoundland birds owned by George Holmes may have been the source of Albin's material. Later Holmes apparently lent his collection to George Edwards (Lysaght, 1971; see below).

Catesby's The Natural History of Carolina, Florida, and the Bahama Islands (1731–43).—North American bird study probably began formally with Mark Catesby's two-volume publication, *The Natural History of Carolina, Florida, and the Bahama Islands* (1731–43). More than 100 species were depicted, and recognition of this early effort has led historians to refer to Catesby, an English naturalist, as the founder of North American ornithology (Allen,

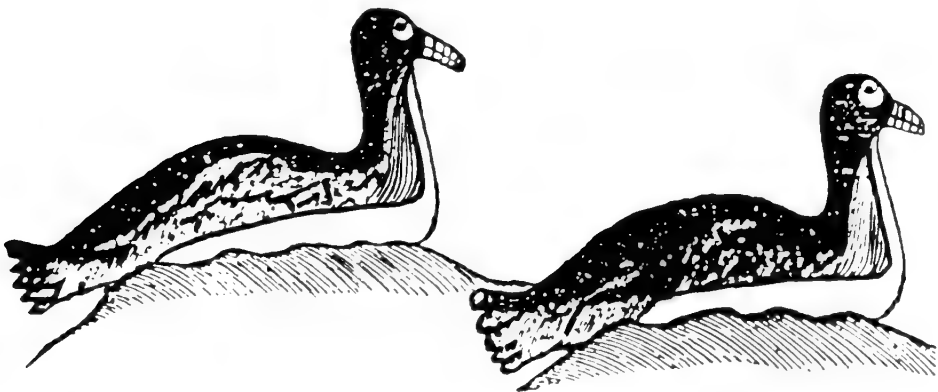


FIG. 13. Depictions of Great Auks that appeared in the *English Pilot* of 1706 (from Shaw, 1940).

1951). His book was well-received over an extended period, being revised and edited by George Edwards and reissued in second (1754) and third (1771) editions. Though Catesby's book contained no Newfoundland information, his work and Edwards's (1743–51) (Anker, 1938; see below.) set the stage for a rapid expansion of North American bird study (Forster, 1771; Pennant, 1784–87). These books had a profound influence on George Cartwright (below) and Joseph Banks (Chap. 5), the first scientifically oriented naturalists to engage in Newfoundland studies.

Linnaeus's Anas histrionicus (Harlequin Duck) from Newfoundland (1753).—In his *Natural History of Uncommon Birds*, Edwards (1743–51) referred to a collection of Newfoundland birds in the Tower of London. In the late 13th century a section of the Tower had been set aside by Henry III as a menagerie, and specimens brought back from various parts of the world by British naval officers, as well as gifts from foreign kings and dignitaries, were customarily housed there. Linnaeus's 1753 description of the Harlequin Duck is based on Edwards' (1749:99, in Lysaght, 1971) account of a specimen "brought with others, preserved, from Newfoundland in America, . . . lent me by Mr. Holmes of the Tower of London." Newfoundland is thus the type locality for *histrionicus*.

Captain George Cartwright (1770–86), a curious naturalist.—A natural historian par excellence, Cartwright kept diaries during a residence in southern Labrador from 1770 through 1786. These he developed into a large three-volume work, *A Journal of Transactions and Events, during a Residence of Nearly Sixteen Years on the Coast of Labrador Containing Many Interesting Particulars, Both of the Country and Its Inhabitants, Not Hitherto Known*, which was published in 1792. Joseph Banks (Chap. 5), whom Cartwright had met in St. John's in 1766 and for whom Cartwright subsequently collected Labrador specimens, is listed as a subscriber to the *Journal*. From Townsend's (1911) edited and abridged version of Cartwright's *Journal*, we have compiled a list of 49 birds, of which only two were recorded for insular Newfoundland. A few of his observations are of special interest.

In 1785 he reported the unrestrained destruction of Great Auks nesting on Funk Island and seems to be the first to warn of their extinction (Fig. 14).

. . . it has been customary of late years for several crews of men to live all summer on that island [Funk], for the sole purpose of killing birds for the sake of feathers, the destruction they have made is incredible. If a stop is not soon put to that practice, the whole breed will be diminished to almost nothing, particularly the penguins: for this is now the only island they have left to breed upon . . .

His words did not fall on deaf ears, magistrates in St. John's banned eggging and poaching on Funk Island and, using tactics no longer resorted by



FIG. 14. The grassy meadow on Funk Island, the graveyard of the Great Auk. Vegetation has grown up on the humus of decayed auks and other alcids. The bones in the foreground were exhumed in the immediate area. The cairn in the background is constructed of stones from previous huts and "penguin corrals" (photo: WAM).

wildlife officers, enforced the ban through public flogging of offenders (Elliott, 1786).

Cartwright was truly a curious naturalist and spent much time studying animals. He weighed and collected seabird and duck eggs, nests, and skins, and kept a pair of free-flying captive Gray Jays in his house. He was probably one of the first naturalists to document that the seasonal plumage changes of ptarmigan resulted from feather molts (Townsend, 1911). Although Aristotle was aware that molting was the mechanism of seasonal color changes (Allen, 1951), most zoologists of Cartwright's time were of the impression that the feathers actually changed color (Lysaght, 1971:80–82).

Cartwright made extensive notes in his copy of Pennant's *Arctic Zoology* (1784–87, 2nd ed.) (Chap. 5). His comments on the Eskimo Curlew, which were recorded by Lysaght (1971, Appendix 1), are worth quotation:

The birds always make their first appearance on the coast of Labrador between the 28th of July and the 8th of August, and are to be met with in the greatest abundance everywhere along the seacoast where the ground is clear of timber and provides plenty of heath-berries. At their first coming they are lean, but soon grow very fat. In general they are plentiful till the middle of September, and some few are to be met with as late as the middle of October, but hard gales of wind from the northwest to the northeast cause them to migrate sooner. They are never seen on their return to the northward. Some few are double the size of the rest and not so delicious. I have known a man to shoot 150 in a day.

The larger birds are Whimbrels, which then migrated with fall flocks of Eskimo Curlews (Banks, 1766, in Lysaght, 1971; Reeks, 1869; Fig. 21). Southerly migrating Whimbrels still begin arriving on insular Newfoundland in July. Gollop, et al. (1986) tabulated Cartwright's diary entries on the Eskimo Curlew. Using this information they suggested that during the late 1700s these birds were common in southern Labrador for approximately two weeks, from around 19 August to about 3 September.

On 14 July 1770 Cartwright shot an American Black Duck at Charles Brook, Newfoundland, the first known record for the island. Banks had earlier collected a black duck, but it cannot be ascertained if he obtained the bird in Newfoundland or in Labrador (Table 3). American Bittern, Great Horned Owl, and swallows were also recorded in Cartwright's *Journal*. Young and adult "Sea Pidgeons" (Black Guillemots) and gull chicks were noted to be delicious eating (see, also, Salomonsen, 1967). Dovekies were referred to as bull- or ice-birds, being the harbingers of winter ice, and Great Black-backed Gulls were called saddlebacks; these vernaculars are still used by many Newfoundlanders today (Appendix II).

Aaron Thomas's diary (1794–95).—During a visit to Newfoundland in 1794–95, Thomas kept a diary which of his own accord sketched and stretched tales for the entertainment of a friend for whom the diary was written. Some of the birds he mentioned include,

. . . Birds of their motions answering the British Blackbird, but their colour widely different, Thrushes which are Red, Lewes that are beautiful and larger than a Goose, with a vast variety of other Birds of different sizes. The Coast abounds with Sea Birds. Here are Sea Gulls so large from the extremity of each wing, when extended, measures Four feet, Penguins, Hegdowns, Murrs and Turrs, Ice Birds, Mother Carey's Chickens, Loons, Noddys, Sea Parrots, Sea Pigeons and a number of other Sea Fowl (Murray, 1968: 143–4).

EARLY WRITTEN ACCOUNTS OF BIRDS (1007–1795 A.D.)

The red thrushes may have been Fox Sparrows, Pine Grosbeaks, Purple Finches, or Red Crossbills, all of which are widespread and abundant today. The seagulls were probably Great Black-backed Gulls, though they might have included Glaucous Gulls. Some Newfoundlanders still refer to Common Loons and Atlantic Puffins as Lewes and Sea Parrots (Peters and Burleigh, 1951b; Appendix II).

Bald Eagles were abundant on the south coast, and many puffins nested on Grand Columbiar Island near St. Pierre. About 50 years later, J. B. Jukes (p. 74) also located this colony; in 1982, R. Etcheberry (pers. comm.) estimated that approximately 400 pairs of puffins bred there. Thomas also included some gory, obviously distorted and exaggerated, speculative descriptions of the brutalization of Great Auks on Funk Island. These have been given sharp but uncritical attention by Mowat (1984).

The writings reviewed in this chapter scan a period of about eight centuries. The earliest reports are the products of the European explorers in North America, and their accounts provide the most important information about North American avifauna that is available from the 16th century. Seventeenth century information comes for the most part from New World colonizers, and formal natural history documentation began in earnest in the 18th century. Natural history efforts in Newfoundland and Labrador during the 18th century are dominated by the work of Sir Joseph Banks. The next chapter presents a synopsis of his North American achievements.

SIR JOSEPH BANKS' VISIT TO NEWFOUNDLAND AND LABRADOR IN 1766

Joseph Banks' natural history expedition to Newfoundland and Labrador in 1766 was one of the first such ventures in the New World. Banks' objectives were primarily botanical, and many of his herbarium sheets are still housed in the British Museum. He also collected marine fishes and birds. The details of Banks' North American visit were only recently brought to light by Lysaght, (1959: 1971), and in 1979 Memorial University of Newfoundland bestowed an Honorary Doctor of Laws Degree upon her in recognition of these scholarly works. Our present treatment of Joseph Banks' avifaunal findings rests heavily on an analysis of Lysaght's material.

BIOGRAPHICAL AND ORNITHOLOGICAL BACKGROUND

Just before making his well-known scientific collections during Captain James Cook's voyages (1768–71) to the South Pacific (Beaglehole, 1963), Banks had worked in Newfoundland and Labrador. He was eminent among the British scientists of his day and was President of the Royal Society for more than 40 years (1778 to 1820). His extensive collections and library eventually formed the nucleus of the British Museum (Natural History). He was extremely wealthy and was often assisted by servants in the field.

Having decided on a profession early in life, he was 23 when he carried out the North American expedition. Banks arrived on board the 32-gun frigate, *H.M.S. Niger*, at St. John's on 11 May 1766, and departed on 11 June for Croque on the Northern Peninsula, where he remained until sailing for Chateau Bay, Labrador on 6 August. Banks worked in Labrador through 3 October, then returned to Croque for a brief six-day stay before departing for St. John's on 10 October. After two weeks (13–28 October) in St. John's, he sailed for England (Lysaght, 1971).

None of Banks' bird skins have survived, because specimen preservation in the 18th century was rather crude. Owing to this difficulty, artists were engaged on major scientific expeditions to document the specimens of "new" and unusual species (Allen, 1951). Sydney Parkinson, who worked for Banks and later accompanied him to the South Pacific, and Peter Paillou painted many Newfoundland and Labrador birds from Banks' material. Some of their paintings were lost for nearly two centuries, until Lysaght (1959, 1971) uncovered them (Fig. 15). Many of Parkinson's drawings were located in the British Museum, and Paillou's in the Blackner Library of McGill University. In addition, Banks' zoological notebook was found in the McGill University library, and his Newfoundland diary turned up in the Royal Geographic Society of Adelaide, Australia. These long-lost documents show clearly that several of Banks' specimens and drawings were the "types" of new species that were later formally described by others.



FIG. 15. Sydney Parkinson's painting of an immature Merlin collected in Newfoundland by Sir Joseph Banks (courtesy of Trustees of the British Museum).

Lacking the perseverance to carry interesting preliminary leads through to scholarly completion (Beaglehole, 1963; Beer, 1963), Banks published nothing about the Newfoundland voyage as such. He did, however, fre-

quently describe material from his collection, basing the description on a single specimen even when there were many. Often he gave away specimens, apparently without keeping duplicates of those that were "newly discovered" species. His unbounded generosity in allowing others free access to his collections and manuscripts resulted in much of his avian material surfacing elsewhere; contemporary biologists owe him more than can be easily assessed. In 1768 Banks lent Thomas Pennant many bird skins from Newfoundland and Labrador, paintings by Parkinson, his Newfoundland diary, and zoological notes. Paillou was working for Pennant at this time and painted many of these specimens. Pennant used this material to prepare species lists that were published in J. R. Forster's *A Catalogue of the Animals of North America* (1771). Detailed descriptions of Banks' material, and Parkinson's and Paillou's paintings, later appeared in Pennant's *Arctic Zoology* (1784–87) and John Latham's *General Synopsis of Birds* (1781–1802). These authors often failed, however, to distinguish between Newfoundland and Labrador localities. Lysaght (1971: 95) contends that Pennant's meagre acknowledgement of Banks' input to his work was a major reason why Banks' contributions to Newfoundland ornithology had been overlooked for so long.

Johann Friedrich Gmelin edited the 13th edition of Linnaeus's *Systema Naturae* (1788), which included descriptions and some initial taxonomic assignments for the Newfoundland and Labrador birds mentioned by Forster, Pennant, and Latham. Unfortunately, Gmelin had no access to Banks' material, so some descriptions were too inadequate to allow later identification by taxonomists, and some of Gmelin's names have been discarded. Like Pennant, he described some immature forms (see below), as distinct species. Skilled systematists, such as C. E. Hellmayr and Bowdler Sharpe, tried to trace the basis for Gmelin's nomenclature, but being unaware of Banks' collections and manuscripts their task was futile (Lysaght, 1971).

Banks collected the first Rough-legged Hawks in the New World. Paillou's fine paintings of these specimens illustrated immatures and adults of both color phases, and it was initially assumed that three different species were represented. Forster (1771) referred to a Rough-footed Hawk, which Latham (1781) later named the St. John's Falcon, along with an immature collected at Placentia which he called the Placentia Falcon. Pennant (1785) named a dark-phased immature specimen, the Chocolate-coloured Falcon. Gmelin (1788) later applied the name *Falco S. Johanni* to the St. John's specimen, based on information from Latham (1781) and on Paillou's painting in Pennant's *Arctic Zoology*. (Fig. 16). The form is now considered to be in the genus *Buteo* and is a race of *B. lagopus*.

Another bird of prey first collected in North America by Banks is the Northern Goshawk. Based on a drawing by Paillou, Latham (1781) named it the New Foundland Falcon. Gmelin (1788) published a short Latin description of it under *Falco novae-terrae*, but the name was preoccupied by *gentilis*, by which it is now known.



FIG. 16. Rough-legged Hawk collected in Newfoundland by Sir Joseph Banks and painted by Peter Paillou (courtesy of Trustees of the British Museum).

DOCUMENTATION OF 34 SPECIES OF BIRDS ON INSULAR NEWFOUNDLAND

Most of Banks' specimens were collected in Chateau Bay, Labrador, although many were also taken on the island of Newfoundland. Here we review this material with special emphasis on the 34 birds that can be conclu-

sively recorded for insular Newfoundland. This exercise generates a list of the earliest collected specimens in northeastern North America.

The compilation of species lists from ornithological works of previous centuries can be a demanding task. Common and scientific names change considerably over time, and Europeans often confused New World species with similar Old World ones. Lysaght (1971) set a high scholastic standard in her systematic unraveling of the birds that Banks collected. When assumptions as to identification are made in the present work they are documented; readers can assess the validity of the interpretations for themselves by checking original sources and specimens (when available), and by considering recent distribution and abundance patterns.

1. *Common Loon*.—Banks had specimens from Croque and Chateau Bay. No painting has been located in the British Museum's series of Banks' Newfoundland birds, but there is a painting in the Taylor White Collection which, though unsigned, appears to be by Paillou (Lysaght, 1971). On it White has written, "This bird I had from Mr. Banks and I suppose he brought it from Canada but am not certain" (Lysaght, 1971: 359). There was an earlier Newfoundland specimen which was documented in Albin's (1738) book (see p. 53).

2. *Unidentified Shearwaters* (*Puffinus sp.*).—When the *Niger* reached the Grand Banks on 7–8 May, Banks noted shearwaters. Greater and Sooty Shearwaters are common on the banks during summer, with the former greatly outnumbering the latter (L. M. Tuck, 1967a). If their migratory chronologies in 1766 were similar to those of today, Sooty Shearwaters may have been the species that Banks observed, for they tend to be the more common shearwater in Newfoundland waters in early May (Brown, et al., 1975; Brown, 1986).

3. *American Bittern*.—Banks mentioned this species in an incomplete list of his specimens, but there is no description in his surviving manuscripts (Lysaght, 1971). However, Paillou painted this bird (Fig. 60, in Lysaght, 1971) from a "dry specimen brought from Newfoundland" which was loaned to Pennant.

4. *Common Eider*.—Banks commented on the immense flocks of eiders during June in Hare Bay and Croque, and the specimens he brought back to England were probably collected at one of those localities. Parkinson painted a male/female pair from the collection (Fig. 65, in Lysaght, 1971), which appears to be of the subspecies *borealis*, a race that does not nest in Newfoundland but is a common winter resident (Peters and Burleigh, 1951b; Godfrey, 1966). Banks also described an eider with a black V-line on its throat. In the past these birds have been considered to be the Pacific *v-nigra* subspecies (Peters and Burleigh, 1951b), but this mark is now known to occur in all subspecies of eiders (Lysaght, 1971; see, also, pp. 115 and 137).

5. *King Eider*.—Paillou painted a male from Newfoundland (Fig. 66, in Lysaght, 1971), which is not mentioned in Banks' writings.

6. *Northern Harrier*.—Paillou painted a juvenile from a Newfoundland skin (Figs. 71, 72, in Lysaght, 1971), which Latham described as the "White-rumped Bay Falcon."

7. *Northern Goshawk*.—A specimen of an immature taken on 5 October at Croque and painted by Paillou (Plate VI, in Lysaght, 1971) became, via Latham's (1781) account, Gmelin's (1788) New Foundland Falcon, *Falco novae-terrae*. Croque is the type locality, although the name is a synonym of *gentilis*.

8. *Rough-legged Hawk*.—Banks collected a series, eventually described by Latham (1781) as the St. John's Falcon and the Placentia Falcon. A dark-phased individual was named the Chocolate-coloured Falcon by Pennant (1785). Paillou painted these specimens (Plate X, Figs. 68–70, in Lysaght, 1971; see Fig. 16), and Gmelin (1789) described and named, *Falco S. Johannis*, the specimen being shot at St. John's.

9. *Merlin*.—Banks collected a juvenile and an adult male; both were painted by Parkinson (Figs. 74–75, in Lysaght, 1971; see Fig. 15).

10. *Willow Ptarmigan*.—Banks described in detail the mainland race from Chateau Bay but left no notes on specimens that he might have collected in Newfoundland. However, a Parkinson painting (Plate XII, in Lysaght, 1971) shows a bird in nearly full winter plumage with brown coloring along the dark shafts of the primaries, indicating the subspecies *alleni* which is restricted to insular Newfoundland (Peters and Burleigh, 1951b; Godfrey, 1966).

11. *Spotted Sandpiper*.—Banks collected one at St. John's on 31 May. He understandably misidentified it as *Actitis hypoleucos* (European Common Sandpiper), which is similar to the spotted sandpiper (Peterson, et al., 1966; Peterson, 1980) but which only rarely occurs in North America in Alaska. He noted that they were called "beach birds"; many Newfoundlanders still refer to them as "beachy-birds" (Appendix II).

12. *Black-legged Kittiwake*.—On 26 May at St. John's Banks collected a gull "differing but little from the Common [Mew] Gull" which Lysaght (1971: 122, 160) logically considers may have been a kittiwake. He also collected an adult and immature at Chateau Bay, Labrador. On the back of Parkinson's painting of an adult kittiwake (Fig. 80, in Lysaght, 1971) Banks wrote "Newfoundland." On these bases we place this species on Banks' Newfoundland list.

13. *Great Auk*.—Banks noted a large number of "Penguins" about the ship on 7–8 May on the Grand Banks. He apparently collected a bird in Chateau Bay, Labrador (Lysaght, 1971).

14. *Black Guillemot*.—On 28 May he collected a specimen near St. John's.

SIR JOSEPH BANKS' VISIT TO NEWFOUNDLAND AND LABRADOR IN 1766

Banks also recorded a great abundance of "Sea Pigeons," puffins, shearwaters, and gulls along with the "Penguins" on the Grand Banks on 7–8 May, but this apparently involved a misidentification as Black Guillemots maintain a restricted coastal distribution (Brown, et al., 1975). Murres, which are common on the banks in spring (L. M. Tuck, 1961; Brown, et al., 1975), were not mentioned and may be the birds to which Banks referred.

15. *Atlantic Puffin*.—See above entry.

16. *Nothorn Hawk-Owl*.—One was collected at Croque by F. Anchele, the second mate of the *Niger's* surgeon, and given to Banks. Another was collected at Chateau Bay. Parkinson painted the species (Plate II, in Lysaght, 1971).

17. *Belted Kingfisher*.—Banks collected a female at Croque on 15 June.

18. *Hairy Woodpecker*.—Banks describes in detail a female he received from the "southern part of Newfoundland."

19. *Barn Swallow*.—A specimen was taken at St. John's on 2 June.

20. *Gray Jay*.—Banks collected this bird at Croque and Chateau Bay.

21. *Common Raven*.—Although there is no reference to a raven in Banks' manuscripts, his collection of one in Newfoundland is supported by Penant's letter to him on 20 February 1768, in which he states he is returning the Newfoundland birds but "left out a raven" (Lysaght, 1971:418).

22. *Black-capped Chickadee*.—This was the first species Banks collected in Newfoundland (at St. John's on 12 May). He referred to it as "Black cap *Parus ater*" (Coal Tit, which does not occur in North America). Later he made note of an unlabelled *P. palustris* (Marsh Tit), another similar European tit that does not occur in North America. These three congeneric species are quite similar in appearance (cf., Peterson, et al., 1966; Peterson, 1980). He may also have collected a Boreal Chickadee.

23. *Swainson's Thrush*.—Of this bird Banks wrote "sings agreeably enough" (Lysaght, 1971:126); he collected on a Croque on 15 June.

24. *American Robin*.—Banks found this bird common about St. John's, where he collected one on 12 May. Later he took specimens at Chateau Bay and had at least four skins.

25. *Northern Shrike*.—At Croque on 15 June Banks collected a specimen of which he wrote, belonged to the "Butcher Bird tribe, *Lanius*?"

26. *Yellow Warbler*.—A series of "Gold birds" that Banks collected at St. John's from 2 to 7 June included this species, which was painted by Parkinson (Fig. 83, in Lysaght, 1971), Wilson's Warbler, and possibly also the Palm Warbler.

SIR JOSEPH BANKS' VISIT TO NEWFOUNDLAND AND LABRADOR IN 1766

27. *Blackpoll Warbler*.—Banks shot a female at St. John's on 7 June.

28. *Wilson's Warbler*.—See entry 26 above.

29. *Savannah Sparrow*.—On his first trip ashore at St. John's on 12 May, Banks collected this bird. Five skins were found in his collection keg. Lysaght (1971) notes that Banks actually "discovered" this species in 1766, though Gmelin first described the species in 1789, based on a specimen from the west coast of North America.

30. *Fox Sparrow*.—Banks described this species as an unidentified *Fringilla* when he first collected it on 26 May at St. John's. He took another on 7 October at Croque, redescribing and naming it *F. betula*. The species was painted by Parkinson (Plate I, in Lysaght, 1971) from Banks' specimens.

31. *Swamp Sparrow*.—Banks obtained a specimen at St. John's on 26 May.

32. *Pine Grosbeak*.—On 31 May a specimen was taken at St. John's.

33. *Rusty Blackbird*.—Banks' servant collected a specimen at Croque on 18 June, and Banks may have obtained another at Chateau Bay.

34. *White-winged Crossbill*.—Banks collected this bird at Croque and Chateau Bay.

This list of the 34 species that are known to have been secured by Banks indicates that he far exceeded anything that had been accomplished before his expedition. It was not until about 70 years later that more extensive lists of the Newfoundland avifauna were generated by Audubon and Bonnycastle (pp. 73, 83).

OTHER INTERESTING AVIFAUNAL INFORMATION

In addition to his ornithological initiatives in Newfoundland, Banks collected or identified at least 44 species in Labrador. Many others, for which precise details of location or specific identification are lacking, were also taken or observed. In all, Banks documented at least 91 North American species and subspecies (Table 3).

Some of the Labrador birds warrant special mention. Red-throated Loons and Harlequin Ducks were locally referred to as whobbies and lords and ladies (Appendix II). Interestingly, Latham (1785) and Pennant (1785) published the first descriptions of the American Black Duck, suggesting that Banks may have returned to England with a specimen. Banks' Green-winged Teal specimen(s) from Labrador was probably part of Gmelin's 1789 type material that was derived from Pennant (1785; Lysaght, 1971). Banks had skins of male and female Labrador Ducks (Fig. 39) which were described by Latham (1785), though not mentioned in any of Banks' writings. Lysaght (1971) suggests that Banks' friend George Cartwright (p. 54) may have sent the specimens to Banks from Labrador.

TABLE 3. List of Joseph Banks' 1766 Newfoundland and Labrador specimens (species painted by Sidney Parkinson and Peter Paillou, with their corresponding plates in Lysaght, 1971, footnoted).

NEWFOUNDLAND	LABRADOR	UNSPECIFIED LOCALITY OR LESS THAN POSITIVE IDENTIFICATION
1. Common Loon	Red-throated Loon	Leach's Storm-Petrel
2. Unidentified shearwater	Common Loon	Northern Gannet
3. American Bittern ^a	Canada Goose	American Black Duck
4. Common Eider ^b	Green-winged Teal ^c	Common Eider ^b
5. King Eider ^d	Northern Pintail ^c	Bald Eagle
6. Northern Harrier ^f	Blue-winged Teal ^g	Golden Eagle
7. Northern Goshawk ^h	Labrador Duck	Long-billed Curlew
8. Rough-legged Hawk ⁱ	Harlequin Duck ^j	Hudsonian Godwit
9. Merlin ^k	Oldsquaw	Sanderling ^l
10. Willow Ptarmigan ^m	Black Scoter	Semipalmated Sandpiper
11. Spotted Sandpiper	Surf Scoter ⁿ	White-rumped Sandpiper
12. Black-legged Kittiwake ^o	Red-breasted Merganser	Ring-billed Gull
13. Great Auk	Rough-legged Hawk ⁱ	Glaucous Gull
14. Black Guillemot	Unidentified eagle	Common Murre
15. Atlantic Puffin	Peregrine Falcon ^p	Great Horned Owl
16. Northern Hawk-Owl ^q	Spruce Grouse ^r	Short-eared Owl
17. Belted Kingfisher	Willow Ptarmigan	Northern Flicker ^s
18. Hairy Woodpecker	Rock Ptarmigan	Blue Jay
19. Barn Swallow	Greater Yellowlegs ^t	Yellow-rumped Warbler
20. Gray Jay	Eskimo Curlew ^u	Palm Warbler
21. Common Raven	Whimbrel	Northern Cardinal
22. Black-capped Chickadee	Lesser Golden-Plover	American Tree Sparrow
23. Swainson's Thrush	Ruddy Turnstone ^v	White-throated Sparrow
24. American Robin	Semipalmated Plover	
25. Northern Shrike	Red Knot	
26. Yellow Warbler ^w	Least Sandpiper ^x	
27. Blackpoll Warbler	Dunlin	

TABLE 3. Continued

NEWFOUNDLAND	LABRADOR	UNSPECIFIED LOCALITY OR LESS THAN POSITIVE IDENTIFICATION
28. Wilson's Warbler 29. Savannah Sparrow 30. Fox Sparrow ^y 31. Swamp Sparrow 32. Rusty Blackbird 33. Pine Grosbeak 34. White-winged Crossbill	Short-billed Dowitcher Common Snipe Red Phalarope Red-necked Phalarope Unidentified jaeger ^r Great Black-backed Gull Black-legged Kittiwake ^o Great Auk 35. Black Guillemot 36. Northern Hawk Owl ^q 37. Horned Lark ^{av} 38. Gray Jay 39. American Robin 40. Fox Sparrow ^y 41. Snow Bunting 42. Rusty Blackbird 43. White-winged Crossbill 44.	^a Fig. 60 ^b Fig. 65 ^c Fig. 63 ^d Fig. 66 ^e Fig. 61 ^f Figs. 71,72 ^g Fig. 62 ^h Plate VI ⁱ Figs. 68,69,70; Plate X ^j Fig. 64 ^k Figs. 74,75 ^l Fig. 78 ^m Plate XII ⁿ Fig. 67 ^o Fig. 80 ^p Fig. 73 ^q Plate II ^r Plate V ^s Fig. 81 ^t Plate XI ^u Plate III ^v Fig. 76 ^w Fig. 83 ^x Fig. 77 ^y Plate I ^z Fig. 79 ^{aa} Fig. 82

SIR JOSEPH BANKS' VISIT TO NEWFOUNDLAND AND LABRADOR IN 1766

Banks had a captive immature eagle at Chateau Bay, that he identified as "*Chrysaetos* of Linne." Lysaght (1971) considered this to be a Golden Eagle. Owing to the scarcity of these birds in Labrador, to their tendency to be occur inland (Todd, 1963), and to the similarity between immature Golden and Bald Eagles, it is listed as an unidentified eagle in Table 3. Banks noted two different types of eagles, but again the matter is complicated by age-related plumage differences. Apparently he saw no Osprey (Lysaght, 1971), which are common along the coast today (I. Kirkham, pers. comm.).

Parkinson painted a beautiful pair of Spruce Grouse (Plate V, in Lysaght, 1971) based on specimens from Chateau Bay. Banks indicated that ptarmigan became more plentiful along the Labrador coast in September, an apparent indication of movements from higher and more northerly regions (Lysaght, 1971). The Lesser Golden Plover was recorded as arriving at Chateau Bay on about 16 August, a date comparable to that noted by later ornithologists (Todd, 1963), and about a week earlier than their arrival in Newfoundland. Eskimo Curlews were in great abundance and feeding on Crow or Curlewberries at Chateau Bay from 9 August through 6 September (see, also, Cartwright's notes on these birds, p. 54). Plate III, in Lysaght (1971) shows Parkinson's painting of these birds. Both Pennant (1785) and Latham (1785) refer to "Stone Snipe" (Greater Yellowlegs), a name based on Banks' "Stone Curlew," and cite its occurrence at Chateau Bay. Because Gmelin (1789) cites Pennant in naming *Scolopax melanoleuca*, Paillou's painting (Plate XI, in Lysaght, 1971) becomes the type material and Chateau Bay the type locality for the Greater Yellowlegs. Latham's (1785) and Pennant's (1785) descriptions of "Nodding Snipe" (Short-billed Dowitchers) from Chateau Bay were the basis of Gmelin's (1789) *Scolopax nutans* (later *S. grisea*). Forster (1771) also refers to a specimen of this bird, though no evidence for one has yet been found (Lysaght, 1971).

Banks, and later Cartwright, established precedents and a set high standards for subsequent natural history study. The interest that they sparked, however, found a much wider audience in the early 19th century than during their lives. It was a long time before such champions of natural history again appeared on the scene.

EARLY NINETEENTH CENTURY NATURALISTS

With the exception of the notable contributions of Banks and Cartwright, due attention was not paid to natural history and bird study until the early 19th century. At that time some historical and geographical accounts were written by men who had strong interests in fauna and flora. This tendency was especially marked among geologists (e.g. Cormack, Jukes, and later Howley; see p. 122). These well-rounded naturalists greatly advanced the knowledge of avifaunal diversity and distribution in Newfoundland. In the present chapter we have compiled the ornithological information that can be gleaned from the historical and geological surveys written during the early 19th century.

REVEREND LEWIS AMADEUS ANSPACH'S *A HISTORY OF THE ISLAND OF NEWFOUNDLAND* (1819)

Apart from what can be gathered from Banks, the next earliest listing of the island's birds was compiled from Reverend Anspach's *A History of the Island of Newfoundland* (1819). Before Lysaght's (1959, 1971) studies of Banks' North American discoveries, the Anspach book was considered (e.g., Peters and Burleigh, 1951b) to contain the first formal account of Newfoundland birds. At least 22 kinds of birds are referred to (Table 4). Anspach recorded seven species for Newfoundland that Banks did not, viz., Red-throated Loon (Whabby differentiated from loon), Canada Goose, Harlequin Duck, Old-squaw, Great Black-backed Gull, Common Snipe, and Razorbill.

Anspach argued that owing to their considerable navigational significance to mariners, especially during foggy weather, seabirds deserved legislative protection from hunters and eggers (for descriptions of the impacts of professional eggers, see Frazer, 1887; Audubon, 1897; and Townsend, 1907:256–262). The seabirds in question “were generally called Baccalao birds” because they nested in multitudes on Baccalieu Island. Some local residents still refer to murres or puffins as “Baccalieu Birds” (L. M. Tuck, 1961), and both species still breed on Baccalieu Island (p. 161). Anspach also reported that Great Auks were “utterly extinct” by his time, though he confused Fogo Island with Funk Island (Anspach, 1819:317; see, also, p. 147, Steenstrup, 1855, and Kirkham and Montevicchi, 1982). Both Fogo and Funk Island were called Penguin Island from the 16th through mid-18th century (Peters and Burleigh, 1951b), and this may have created the confusion.

WILLIAM EPPS CORMACK'S WALK ACROSS NEWFOUNDLAND, 1822

Cormack was born in St. John's in 1796, but grew up in Scotland and studied at the Universities of Glasgow and Edinburgh. Cormack's efforts to locate and study Beothuks are well known (p. 40).

EARLY NINETEENTH CENTURY NATURALISTS

TABLE 4. Birds mentioned in Anspach's *A History of the Island of Newfoundland* (1819).

SPECIES	ANSPACH'S NAME
1. *Red-throated Loon	Whabby
2. Common Loon	Loon
3. *Canada Goose	Bustard
4. Common Eider	Eider Duck
5. *Harlequin Duck	Lord and Lady
6. *Oldsquaw	Hounds
7. Eagles	same
8. Hawks	same
9. Falcons	Kites
10. Willow Ptarmigan	Partridge (Heathcocks ¹)
11. Plovers	same
12. Curlews	same
13. *Common Snipe	Snipe
(Woodcock sp. ²)	same
14. ?Herring Gulls	Gulls
15. *Great Black-backed Gull	Saddle-back; Blackback
16. ?Black-legged Kittiwake	Mews ³
17. *Razorbill	Tinker; Razor-bill
18. Great Auk	Penguin
19. Atlantic Puffin, Common Murre	Baccalao Birds
20. Jays	Jays
(Magpies ⁴)	Magpies
21. Common Raven	Ravens

*Species that were not documented by Banks for insular Newfoundland.

¹Anspach listed both partridge and heathcock, an apparent differentiation of winter and summer plumaged Willow Ptarmigan, which are abundant in the Conception Bay area where he lived.

²American Woodcocks are rare breeders in Newfoundland (Appendix I), and it is unlikely that they ever occurred in abundance. Perhaps Anspach referred to other shorebirds, e.g. Greater Yellowlegs, as Woodcocks.

³Mews refer to Mew Gulls, which rarely occur in Newfoundland and are probably misidentified Black-legged Kittiwakes.

⁴Magpies have never been known to occur in Newfoundland and it is not known to which species Anspach referred.

His "Narrative of a Journey across the Island of Newfoundland in 1822" was published in the *Edinburgh Philosophical Journal* and includes mention of about 20 species of birds, all of which had been previously reported. Two species of loon were stated to occupy "almost every lake" in the interior "during breeding" (see, also, Bruton and Johnson, 1932). In view of the single record of Red-throated Loons nesting in Newfoundland (Maunder, 1978), Cormack may have erroneously differentiated between age or seasonal plumages in Common Loons. However, nest records of Red-throated Loons on the Northern Peninsula, Miquelon Island, and in southern Labrador, and the many sightings from interior Newfoundland during summer suggest that

EARLY NINETEENTH CENTURY NATURALISTS

these loons could have been more widespread breeders in Cormack's day and may at present be more common nesters than is known. Canada Geese and black ducks were reported to be abundant; the former migrated south from interior nesting areas in early fall, whereas the latter tended to remain on ponds until freeze-up. American Bitterns, Greater Yellowlegs, and Common Snipe were said to breed in bogs and fens. Cormack indicated that curlews (probably in reference to Eskimo Curlews and Whimbrels) bred on the barrens, but there is no evidence that either species has ever nested in Newfoundland. Southbound migrant Whimbrels arrive in early July, and Cormack may have presumed such early birds to be breeders, or he may have considered Whimbrels and Eskimo Curlews to be different age classes of a single species? Puffins were recorded as abundant breeders on Baccalieu Island, where each spring intense eggging activities were carried out until recently (P. Rice, pers. comm.). Like Anspach, Cormack wrote that "Penguins, once numerous on this coast, may be considered as now extirpated, for none have been seen for many years past." Also recorded were Bald Eagles, several hawks, ptarmigan, owls, two or three woodpecker species, and titmice (i.e., chickadees) that "followed us chattering and fluttering." Ptarmigan were noted to spend the night in holes in snow banks, which often froze over causing many to perish.

SIR RICHARD H. BONNYCASTLE'S COMPREHENSIVE LISTING OF NEWFOUNDLAND BIRDS, 1842

Bonnycastle's two-volume work, *Newfoundland in 1842*, contained extensive accounts of birds and other wildlife. Though he claimed that his findings are applicable solely to Newfoundland, Bonnycastle made numerous references to Labrador. This work was a sequel to *The Canadas in 1841*, in which Labrador was considered, and it is likely that some references to Newfoundland and Labrador avifauna derived from there.

In delving through historical accounts, credibility usually has to be assessed on the basis of the species claimed to have been encountered by an author. Some exceptional writers (e. g., Audubon; see p. 83), however, even made note of species that were expected but *not* found. Bonnycastle's work is exemplary in this regard, for he not only noted species missed but often reasoned about their absences. He was also careful to indicate when he did not actually observe a species but was informed of its occurrence. Natural history background is given for many species, and scientific binomials were also used in most cases (a fairly uncommon practice at the time). Despite the continually changing nature of scientific nomenclature, the inclusion of such information is of great utility to compilers of historical information about animals and plants (e.g., Faber, 1982).

Some birds that Bonnycastle noted as absent were (1) wild swans, (2) Killdeer (an uncommon bird today), (3) doves (Columbidae; Rock Doves and Mourning Doves are fairly common today), (4) Northern Saw-whet Owl (ca.

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12 records to 1987), (5) hummingbirds, whose absence was speculated to be due to Newfoundland's lack of flowering trees and insularity (Ruby-throated Hummingbirds have nested), and (6) Eastern Bluebird (a species still not confirmed for insular Newfoundland; Appendix I). Bonnycastle, like others (e.g., Banks, Cartwright, Anspach), apparently erroneously reported some European birds, with which he was familiar, in the place of their North American relatives (e.g., Eurasian Wigeon rather than American Wigeon; Table 5).

Despite his "misses," we compiled a list of 72 species from Bonnycastle's book (Table 5). The fact that this total was greater than Audubon's, who was writing about Newfoundland birds at the same time (see p. 83), indicates the exceptional nature of Bonnycastle's contribution. Twenty-six of Bonnycastle's species had not been reported by Banks, Anspach, or Audubon (see Table 5). Bonnycastle made no mention of eight species that Banks had documented, one (snipe) that Anspach had recorded, and 22 that Audubon had reported.

Thirty-five years after Bonnycastle's publication, Tocque (1878) reviewed the avifauna in his book on Newfoundland. Relying completely on Bonnycastle's account, Tocque added no new information.

JOSEPH BETTE JUKES

Jukes and his coworkers were often dependent on game birds for their next meal as they carried out geological surveys on the island in 1839–40. Consequently, his reports (1842) provide fast, exciting reading. From his writings we constructed a list of at least 29 species (Table 6). Though not a long compilation, particularly in view of Bonnycastle's made at the same time, Jukes recorded some interesting birds. He had (1842, Vol. 2:185–6) what appears to be the first account of Snowy Egret on the island: "The beautiful white egret with elegant drooping plumes on the back, and a very long thin neck, is shot sometimes, but is considered rare." This species is a Newfoundland vagrant today, as is the much rarer European Little Egret. Hummingbirds (i.e., Ruby-throated) that had been missed by Bonnycastle (and all before him) were noted to visit southern shores, and a pair was observed on board a boat in Fortune Bay. Belted Kingfishers, that had been recorded by Banks (p. 65) and Audubon (Table 7) but not by Anspach or Bonnycastle, were also found by Jukes. Snipe were stated to be abundant.

SUMMARY OF EARLY NINETEENTH CENTURY ORNITHOLOGY

Historians and geologists made important ornithological contributions in the early 19th century. By the mid-1800s, however, a turning point in bird study was reached, and while some subsequent historians and geologists also contributed significantly to ornithological knowledge (e.g., Howley; see

TABLE 5. List of birds compiled from Bonnycastle's *Newfoundland in 1842*.

SPECIES		BONNYCASTLE'S	
		NAME	COMMENTS
1.	Red-throated Loon	Imber Goose, ¹ <i>Colymbus immer</i>	Sometimes met with N of island
2.	Common Loon	Great Northern Diver, Loon, <i>C. glacialis</i>	
3.	*Pied-billed Grebe ²	Little Grebe, <i>C. minutus</i>	Frequents N Nfld. & Lab.
4.	Northern Fulmar	Fulmar, Malleomaker	
5.	Shearwater sp.	<i>Puffinus puffinus</i> ³	Abounds
6.	Leach's Storm-Petrel and possibly Wilson's Storm-Petrel	Stormy Petrel, Mother Carey's Chickens, <i>Puffinus pelagica</i>	
7.	*Northern Gannet	Gannet, Solan Goose, <i>Pelicanus bassanus</i>	
8.	*Great Cormorant	Lazy Cormorant, Cormorant, <i>Pelicanus carbo</i>	Common on rocky coast, especially about Trepassey ⁴
9.	American Bittern	Bittern	Did not hear; was told it is common in some parts of Labrador in spring and fall ⁵
10.	?Greater White-fronted Goose	Laughing Goose, <i>Anas albifrons</i>	
11.	Canada Goose ⁶	"vulgarly called Bustard," <i>Anser canadensis</i> ; Common Wild Goose, <i>Anser anser</i>	
12.	*Green-winged Teal	Teal, <i>Anas crecca</i>	
13.	*American Black Duck ⁷	Black Freshwater Duck	
14.	*Northern Pintail	Pintail Duck, Sea Pheasant	Good to eat
15.	?Northern Shoveler ⁸	Shoveller	
16.	*American Wigeon ⁹	Wigeon, <i>Anas penelope</i>	
17.	*Greater Scaup	Scaup, <i>Anas marila</i>	Common in Nfld. & Lab.; said to abound on great lakes and N shore
18.	Common Eider ¹⁰	Eider Duck, <i>Anas mollissima</i>	Down is equally rich as that of eider
19.	Oldsquaw	Long-tailed Duck, <i>Anas glacialis</i>	
20.	*Black Scoter	Black Scoter, <i>Anas nigra</i>	
21.	*White-winged Scoter	Velvet or Great Black Sea Duck	

TABLE 5. Continued

SPECIES	BONNYCASTLE'S	
	NAME	COMMENTS
22. *Common Merganser	Goosander, <i>Mergus merganser</i>	
23. Red-breasted Merganser ¹¹	Red-breasted Merganser, <i>Mergus serrator</i>	
24. Osprey	Canada Fish-Hawk, <i>Falco haliaetus</i>	Plentifully scattered on the coast; no doubt migratory or retreats to interior
25. Eagle sp. ¹²	Sea-eagle, <i>Falco ossifragus</i>	Appears numerous
26. ?Sharp-shinned Hawk	Sparrow-hawk ¹³	Appears numerous
27. Northern Goshawk	Gos-hawk, <i>Falco columbarius</i>	
28. Merlin	Pigeon Eagle, Pigeon Hawk, <i>Falco columbarius</i>	
29. Willow Ptarmigan	Ptarmigan, White Winter Grouse	Very plentiful on the bare highlands . . . covered by berry bearing plants
30. *Black-bellied Plover	Grey Plover	
31. Lesser Golden-Plover	Golden Plover	
32. Spotted Sandpiper	Beach Bird, <i>Tringa hypoleucus</i>	
33. *Eskimo Curlew	Whimbrel, <i>Scolopax phaeopus</i>	
34. *Whimbrel ¹⁴	Long-billed Curlew, <i>Numenius</i>	
35. ?Semipalmated Sandpiper	Purre, Oxeye, ¹⁵ <i>Tringa cinclus</i>	
36. ?Least Sandpiper	<i>Tringa pusilla</i> ¹⁵⁻¹⁶	
37. Common Snipe	American Snipe, <i>Scolopax</i>	
38. *Parasitic Jaeger	Arctic Gull, <i>Larus parasiticus</i>	Pursues the smaller gulls to make them drop prey
39. Herring Gull	Common Gull, Sea Mew, ¹⁸ <i>Larus canus</i>	Very plentiful
40. Great Black-backed Gull	Wagel, Great Grey Gull, ¹⁹ <i>Larus naevius</i>	
41. Black-legged Kittiwake	Kittiwake, Annett, <i>Larus rissa</i>	Of these kinds the Esquimaux make clothing and caps, and use them for food
42. Common Tern ²¹	Tarrock, <i>Larus tridactylus</i> ²⁰ Common Tern, Sea-swallow, <i>Sterna hirundo</i>	Very plentiful

43. ?Black Tern²²
 44. *Dovekie
 45. *Common Murre²³
- Black Tern, *Sterna fuscipedes*
 Little Auk, Icebird, Sea Dove, *Alca alle*
 Guillemot, Merr, Baccalao Bird, *Colymbus trolle*
- Met with occasionally
 Very strange head, bird-like look
- Rarely seen beyond banks it frequents for offal from fishing vessels . . . principally resort on shore to a large . . . island at mouth of Conception Bay called Baccalao where they may be seen in uncountable myriads . . . also breed on Funk Islands which are rendered white by accumulation of sea-bird's dung
- Not 50 years ago was a sure sea-mark on the edge of and inside the banks, has totally disappeared from the ruthless trade in its eggs and skin
 Myriads about islands in Bonavista Bay
46. Razorbill
 47. Great Auk
- Razor-bill
 Large Auk, Auk, Penguin, *Alca impennis*
- Occasionally observed
 Two kinds . . . one the speckled sort, not common near settlements
 Several of the family
 Stays about 10 weeks in summer; frequent visitor on east coast²⁶
 Have not seen . . . but he is here; at least a variety has been seen
48. Atlantic Puffin²⁴
 49. *Great Horned Owl
 50. Snowy Owl
 51. ?Northern Hawk-Owl
 52. *Common Nighthawk
 53. Woodpecker's spp.²⁵
- Puffin, Sea-owl, *Alca arctica*
 Eared Owls
 Snow-white Owl
 Light Grey Owl
 Night Hawk, *Caprimulgus virginianus*
 Woodpeckers
- Occasionally observed
 Two kinds . . . one the speckled sort, not common near settlements
 Several of the family
 Stays about 10 weeks in summer; frequent visitor on east coast²⁶
 Have not seen . . . but he is here; at least a variety has been seen
54. Flycatchers
 55. ?Tree Swallow
 56. *Blue Jay
- Fly-catchers
 Sand-martin, *Hirundo riparia*
 Blue Jay
57. *American Crow
 58. Common Raven
 59. Black-capped Chickadee
 60. *Winter Wren
 61. American Robin
- Crow, *Corvus corone*
 Raven
 Black-cap Titmouse, *Parus atricapillus*
 Little Wren
 Newfoundland Blackbird, Robin, *Turdus migratorius*
 Cat Bird, *Turdus felix*
 Butcherbird, Red-backed Shrike, *Lanius collurio*
 Yellow Willow Wren
- Occasionally seen
62. *Gray Catbird
 63. ?Northern Shrike²⁷
 64. Yellow Warbler
- Think I saw

TABLE 5. Continued

SPECIES	BONNYCASTLE'S	
	NAME	COMMENTS
65. Common Yellowthroat ²⁸	Yellow-breasted Chatterer	
66. *American Tree Sparrow ²⁹	Tree Sparrow <i>Canadensis</i>	
67. Savannah Sparrow	Field Sparrow ³⁰	
68. Fox Sparrow	Ferruginous Thrush, <i>Turdus rufus</i> ³¹	
69. Snow Bunting	Snow Bird, <i>Plectrophanes rivalis</i>	Very common on all bare ground and about the fields
70. Pine Grosbeak	Pinefinch, Grosbeak, <i>Loxia enucleator</i>	
71. *Common Redpoll	Lesser Redpoll, <i>Fringilla linaria</i>	Common
72. *Pine Siskin	Yellow-winged Sparrow	

*Not recorded by Banks, Anspach, or Audubon.

¹Bonnycastle classified Imber Goose in the same genus (*Colymbus*) in which he put Common Loon and used the specific name *imber* that is now used for Common Loon. Red-throated Loons have a more northerly breeding distribution. Ember Goose and Imber Diver are old English names for loons (Swann, 1913).

²Smallest grebe that occurs in Newfoundland (Peters and Burleigh, 1951b; Appendix I); similar to the Little Grebe of Britain.

³Probably Greater and Sooty Shearwaters.

⁴Cormorants frequent this area today.

⁵Uncommon breeder in Newfoundland.

⁶Apparent mistaken differentiation of Canada Goose into two species. Also noted Newfoundland Goose "early domesticated . . . a variety of *Anser canadensis*."

⁷Cartwright had earlier shot a black duck in Newfoundland. Bonnycastle also mentioned Mallard, which seems unlikely. The species was considered as hypothetical by Peters and Burleigh (1951b), and is uncommon today.

⁸Possible misidentification. Listed hypothetically by Peters and Burleigh (1951b). Since 1951 there have been five records of this bird, now considered a spring/fall vagrant (Appendix I).

⁹Bonnycastle noted Eurasian Wigeon, which may be due to familiarity with that bird. The American Wigeon is the more common today, though both species occur (Appendix I).

¹⁰Also listed Great Brown Duck that could have referred to female and/or immature Common Eiders, which according to McAtee (1957) have been called Big Salt-water Ducks in Newfoundland (see Appendix II).

¹¹Also listed Shell-drake (*Anas tadorna*), but because the European Shield Duck is not known to have occurred in North America, this is considered a misidentification. Perhaps Bonnycastle saw Red-breasted Merganser or Common Goldeneye (*Bucephala clangula*), common breeding residents today (Appendix I), which he did not mention and mistook them for Shield Ducks. Mergansers are referred to as shell-birds in Newfoundland today (Appendix II).

¹²Probable immature Bald Eagle; less likely a Golden Eagle. Bonnycastle was very familiar with the mature form of the Bald Eagle and missed seeing it (see Peters and Burleigh, 1951b:403).

¹³The Sparrow Hawk of Britain is probably the species to which Bonnycastle mistakenly referred. Sparrow-hawk is a more recent vernacular for American Kestrel. It is much more likely that Sharp-shinned Hawks rather than kestrels would have been thought plentiful by Bonnycastle. Peters and Burleigh (1951b) considered the kestrel hypothetical.

¹⁴Long-billed Curlew has not been confirmed for Newfoundland (Peters and Burleigh, 1951b; Appendix I). What Bonnycastle called Long-billed Curlews were apparently Whimbrels and his Whimbrels were Eskimo Curlews. Both these long decurved bill shorebirds were abundant in the region in the 1840s.

¹⁵Oxeye is an old English name for Dunlin, though it has been also used in reference to other small North American shorebirds, e.g. Sanderling, Semipalmated Sandpiper (McAtee, 1957; see Appendix II).

¹⁶Used by some in Bonnycastle's time (e.g., Audubon) to refer to Least Sandpiper.

¹⁷Notes that other sandpipers found in favorable localities.

¹⁸Mew Gulls are vagrants and have probably never been common in Newfoundland. It is probable that Bonnycastle, like Banks and others (Lysaght, 1971), mistook Herring Gulls for European Mew Gulls.

¹⁹British folk names for immature Great Black-backed Gulls (McAtee, 1957; Appendix II).

²⁰Bonnycastle differentiated two species whose taxonomic and folk names both seem to refer to the Black-legged Kittiwake. Apparently he separated young of the year (Tarrocks) from adults (Swann, 1913; McAtee, 1957). No reference is made to either Glaucous Gulls or Iceland Gulls, though Bonnycastle's Arctic Icebirds may have been intended to include these.

²¹Bonnycastle apparently did not distinguish Common and Arctic Terns. Both breed widely in Newfoundland today.

²²This is an unusual record. Black Tern was not listed by Peters and Burleigh (1951b); the species is now considered a vagrant (Appendix I).

²³No reference is made to Thick-billed Murres, though they also are often referred to as Baccalieu birds (L. M. Tuck, 1961). *U. lomvia* is the more common species in winter, when it is hunted extensively. Puffins have also been called Baccalieu birds (or some version thereof; see p. 220). Murres do not scavenge for offal.

²⁴Black Guillemots, which Banks had mentioned earlier and which are common breeding residents today, were not cited.

²⁵The "speckled sort" may be Northern Flicker.

²⁶Possible misidentification of Tree Swallow, the most common swallow in Newfoundland. Bank Swallows nest on the island's west coast and are rarely sighted in eastern Newfoundland.

²⁷The Gray Jay has also been called Butcherbird (McAtee, 1957) but much less commonly than the shrike (Appendix II).

²⁸Also "thinks" Autumnal Warbler (*Sylvia autumnalis*) occurs. Adult and juvenile Yellow-rumped and Blackpoll Warblers are very common in fall.

²⁹It is quite possible that Bonnycastle's Tree Sparrow referred to the White-throated Sparrow. American Tree Sparrows are most common on the west coast and in the Long Range Mountains of the Great Northern Peninsula (Montevicchi, et al., 1982).

³⁰It is unlikely that Bonnycastle observed a Field Sparrow. Peters and Burleigh (1951b) did not record it, and to date there has been but a single confirmed documentation for Newfoundland. The Savannah Sparrow is the most common field sparrow in Newfoundland.

³¹*Turdus rufus* is the original Linnaean (1758) name applied to Brown Thrasher, based on the Fox-colored Thrush (*T. rufus*) of Catesby. Thrashers are unusual vagrants, and we have listed Fox Sparrow, owing to its reddish plumage and abundance.

TABLE 6. Birds recorded by Jukes (1842).

SPECIES	JUKE'S	
	NAME	COMMENTS
1. Common Loon	Great Northern Diver, "Loo"	
2. Petrels and Shearwaters		Several species of petrel abound
3. Cormorant sp.	Cormorants, "Shags"	Abound
4. American Bittern	Bittern	
5. *Snowy Egret		Sometimes shot . . . rare
6. Canada Goose	Geese	Several flocks on Grand Pond, early Sept.; broods on Rocky River
7. American Black Duck	Black Duck	Abound
8. Common Eider	Eider Ducks	Abound on coast in summer . . . ; fly in flocks; noise exactly like a pack of fox-hounds [uncommon in summer today]
9. Oldsquaw	Hounds	Late July 1840 several broods, brook at head of Clode Sound; some shot Exploits River; abound
10. Red-breasted Merganser	Shell-birds, Sheldrake	Nest near Bloody Bay, Bonavista Bay--summer 1840
11. Osprey	Fish-hawk	
12. Bald Eagle	Eagle, Gripe	Very tame in fog when they move from tuckamoor and edge of woods onto barrens " . . . the people sweep down a whole covey, firing at birds on the ground in a most barbarous and unsportsmanlike manner"
13. Willow Ptarmigan	Common Ptarmigan	

14. Plover spp.	Plover	2 or 3 kinds
15. Greater Yellowlegs	Twillocks	" . . . grey long-legged bird, about size and shape of a plover that frequents the shores and lakes and arms of the sea"
16. Small Shorebirds	Beach Birds	Several
17. Whimbrel	Curlew	August
18. Common Snipe	Snipe	Great abundance
19. Gulls	Gulls	Many young taken on Humber River in August
20. Murre sp.	Murr	
21. Black Guillemot	Seapigeon, kind of auk	Abound
22. Atlantic Puffin	Puffin	Abound
23. ?Great Horned Owl	Brown Owl	Not common
24. Snowy Owl	Snowy Owl	Abundant
25. *Ruby-throated Hummingbird	Hummingbird	Known to visit southern shores; taken on board a boat in Fortune Bay.
26. Belted Kingfisher	Kingfishers, Great Spotted Kingfishers	1 or 2 species of large one [perhaps included flicker?]
27. Jay sp.	Jay	
28. American Robin	Blackbird	Thrush with a red breast and brown back
29. Snow Bunting	Snowbird	Large flocks in winter

*Species not previously noted for insular Newfoundland.

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p. 122), the systematic study of bird life was now for the most part in the hands of specialists. Scientific collectors who had been trained in ornithology in institutions and in the field were the primary data gatherers. In the next chapter we critically analyze the contributions of these pioneers of scientific ornithology.

SYSTEMATIC ORNITHOLOGICAL STUDY, 1833–1900

In the latter half of the 19th century the fundamental problems in ornithology were generated by taxonomic considerations (Farber, 1982). Scientific concern with variation among different geographic populations brought with it, in most instances, critical study, careful documentation, and extensive specimen collecting. Ornithologists amassed collections of bird skins and eggs for comparative purposes.

The original specimens, which are used to describe formally newly-documented species or subspecies (races), are referred to as type specimens (holotypes or syntypes) and are among the most valued possessions of collectors and natural history museums. Type specimens, and their written descriptions, are used as standards to assess variation and to authenticate identifications. Systematic collecting and the preservation of types aided enormously in the standardization of ornithological nomenclature (Farber, 1976).

The “type” concept was a central organizing principle in zoology during much of the 19th century and provided a major theoretical component of pre-Darwinian natural science (Farber, 1976). Problems with species typing arose later, when the static assumptions on which the concept was based provided resistance to new evolutionary theory, and when individual variation within populations was recognized as a serious flaw in the essentialist idea of a “pure type” (Simpson, 1961; Farber, 1976; Mayr, 1982). Rigid type concepts contrasted sharply with newer more fluid notions of biological species (Darwin, 1859; Mayr, 1982).

From about the mid-19th century onward there was a turning away from casual bird observations toward a focus almost exclusively on systematic ornithology. Consequently, our treatment of the material is more critical.

AUDUBON VISITS NEWFOUNDLAND AND QUEBEC LABRADOR

Whenever American ornithology's parentage is haggled about, John James Audubon is the one upon whom the paternal role is most often bestowed. It was Audubon's grandiose four-volume work, *The Birds of America* (1827–38), which was produced in “elephant folio” dimensions so that all species could be depicted full-size, and his accompanying five-volume *Ornithological Biography* (1831–39), that positioned him so prominently in the field of North American bird study. His *Ornithological Biography* was a comprehensive effort to identify all the North American species and to delineate their continental ranges. These volumes contain much information about the Newfoundland and Labrador avifaunas.

In June 1833 Audubon chartered the schooner *Ripley* in Eastport, Maine and set sail for the Quebec North Shore, which was then referred to as Labrador. He was accompanied by six young assistants including his son John,

Joseph Coolidge, William Ingalls, Thomas Lincoln, George C. Shattuck, and John Woodhouse. During this visit Audubon recorded and painted a variety of species, and described a new fringillid, Lincoln's Sparrow, named after Thomas Lincoln. Like Fraser (1887) and Townsend (1907) who worked in Labrador 50–75 years later, Audubon warned about the wanton destruction wreaked by market eggers who relentlessly exploited the coastal seabird colonies each spring (M. R. Audubon, 1897). Audubon's work focused a great deal of ornithological attention on Labrador (e.g., Townsend, 1917, 1918, 1919). As had Banks and Cartwright before him, Audubon contributed to the bird lore and lure of Labrador, even though he actually never set foot in the region referred to by that name today.

On 13 August 1833, during the return voyage, the *Ripley* stopped at St. George's, Newfoundland, where biscuits and pork were traded with the Micmacs for fresh caribou meat. During a stay of a few days Audubon and his colleagues impressively documented 36 species (derived from M. R. Audubon, 1897). The fact that Audubon noted in his diary at least 15 species that had not been previously recorded for the island is testimony that knowledge about birds was extremely limited among most natural history writers up to that time. In total, a compilation of 70 species, including those that Audubon recorded at St. George's in his journal (M. R. Audubon, 1897) and those that are stated to occur in Newfoundland in his *Ornithological Biographies* (1831–39), is given in Table 7. Audubon recorded more than twice as many species as had Banks 67 years earlier. Todd (1963) has found great fault with the inconsistencies in the species records given in Audubon's *Ornithological Biographies* and in his Labrador journal, which was written while Audubon travelled in Quebec Labrador and Newfoundland. Such inconsistencies, while troublesome for subsequent ornithologists, seem inevitable considering the state of ornithological knowledge at the time Audubon was working.

Owl identifications posed problems for Audubon. He recorded two species for Newfoundland (Eastern Screech Owl and Barred Owl) that have still not been conclusively recorded (Appendix I), whereas the relatively common Great Horned Owl was not mentioned. Todd (1963) contended that Audubon's accounts also show confusion about terns, flycatchers, and thrushes, and to these we can add swallows. Even so, Audubon's accounts contain much important information about Newfoundland's avifauna in the early 19th century. Being the knowledgeable and well-travelled observer that he was, Audubon remarked upon many species that he did not observe on the island, including some that had been seen in Labrador (e.g., Red-breasted Nuthatch) and Nova Scotia (e.g., American Kestrel). His accounts were extraordinary and were the impetus to the systematic study of avian identification and distribution in North America.

PHILIP HENRY GOSSE

Gosse, one of the foremost popularizers of natural history in mid-Victorian England, worked as a clerk in Carbonear, Newfoundland from 1827 to

TABLE 7. Birds recorded by Audubon.

AUDUBON'S		
SPECIES	NAME	COMMENT
1. Common Loon	Loon	2 young almost able to fly
2. *Northern Fulmar	Fulmar Petrel	On the banks
3. *Manx Shearwater	Same	Westward of banks
? **British Storm-Petrel ¹	Least Petrel, <i>Thalassidroma pelagica</i>	On banks with Leach's and Wilson's Storm-Petrels
4. Leach's Storm-Petrel	Leach	
	Fork-tailed Petrel, <i>Thalassidroma leachii</i> Bonp.	
5. *Wilson's Storm-Petrel	<i>Thalassidroma wilsoni</i>	Some on banks
6. *Double-crested Cormorant	Some	Pass [migrant?] Nfld.
7. *American Bittern ²	Same	Breeds and leaves end August
8. *Canadian Goose	Same	Breeds
9. *American Black Duck	Same	
10. Common Eider	Eider Duck	Migrant
11. *Common Goldeneye	Golden-eyed Duck	
12. *Harlequin Duck	Same	Migrant
13. *Oldsquaw	Long-tailed Duck	Informed that they bred in considerable numbers on interior lakes
14. *Surf Scoter	Surf Duck	Breeds in great numbers; plentiful on streams
15. *Red-breasted Merganser	Same	
16. *Osprey	Same	
17. Northern Goshawk	Goshawk	
18. Merlin	Pigeon Hawk	
19. *Peregrine Falcon	Same	
20. Willow Ptarmigan	Willow Grouse	
? *Spruce Grouse ³	Spotted or Canada Grouse, <i>Tetrao canadensis</i>	Bought
21. *Lesser Golden-Plover	Golden Plover	Several flocks
22. *Semipalmated Plover	American Ring Plover	Breeds
23. *Greater Yellowlegs	Tell-tale Godwit	

TABLE 7. Continued

SPECIES	AUDUBON'S	
	NAME	COMMENT
24. Spotted Sandpiper	Same	Nesting
25. *Ruddy Turnstone	Turnstone, <i>interpres</i>	Several flocks on Grand Banks (?)
Unidentified Shorebirds	Tringas	Unknown flock
American Woodcock ¹	Same	Not observed; assured that it breeds
26. *Pomarine Jaeger	Same, <i>Lestris pomarina</i> Temm.	
27. *Herring Gull	Same	
28. *Great Black-backed Gull	Same	
29. *Ivory Gull	Same	Young skinned and salted
30. *Caspian Terns	Cayenne Terns	
31-32. *Common and Arctic Terns	Terns, Great Terns	Several pairs
33. Great Auk	Same	Vast multitudes passing S, 20 or 30 with young
? **Eastern Screech Owl	Little Screech Owl	Reported on banks
34. *Snowy Owl	Same	200 mi E of Nfld. on ship (Nov. 1834)
? **Barred Owl	Same	
35. *Short-eared Owl	Same	
36. *Boreal Owl	Little Night Owl, <i>Strix passerina</i> Gmel	Said to be abundant
37. Belted Kingfisher	Kingfisher	None in Labrador
38. Hairy Woodpecker	Same	
39. *Northern Flicker	Golden-winged Woodpecker	
*Unidentified Flycatcher	<i>Muscicapa</i> (Flycatcher)	Probably new
40. ? *Eastern Wood Pewee ⁵	Wood Pewee	Common
? Eastern Kingbird	Martin Swallow	Stated that no Purple Martins seen
41. *Tree Swallow	Same, White-bellied Swallow	

42. *Bank Swallow	Same	Flock about 40 mi. at sea on 12 Aug.
43. Cliff Swallow	Same, Republican Swallow, <i>Hirundo fultva</i>	
44. Barn Swallow	Same, House Swallows	Flock had bred about village; now on passage SW
45. Gray Jay	Canada Jay	
46. Common Raven	Raven	Abound; no crows
47. Black-capped Chickadee	Black-headed or Black-cap Titmouse	Abundant
48. *Boreal Chickadee	Canada or Hudson's Bay Titmouse	Abundant
49. *Brown Creeper	Same	
50. *Golden-crowned Kinglet	Golden-crested Wren	Common; shot young, full grown, and fledged, but not a sign of yellow on head
51. *Ruby-crowned Kinglet	Ruby-crowned <i>Regulus</i>	Common
52. *Hermit Thrush	Tawny Thrush, <i>Turdus wilsonii</i>	Breeds
53. American Robin	Robins	
54. Philadelphia Vireo	White-eyed Vireo	
55. Yellow Warbler	Yellow Red-poll Warbler, <i>Sylvia petechia</i>	Abundant
56. *Magnolia Warbler	Black and Yellow Warbler, <i>Sylvia maculosa</i>	
57. *Black-throated Green Warbler	Same	
58. *Common Yellowthroat	Maryland Yellow-throat	
59. Wilson's Warbler	Green Black-capped Flycatcher, <i>Muscicapa wilsonii</i>	Abundant
60. *Northern Parula ⁶	Blue Yellow-backed Warbler, <i>Sylvia americana</i>	
61. *White-crowned Sparrow	Same	
62. Fox Sparrow	Fox-colored Sparrow	
63. *Lincoln's Sparrow	Same	

TABLE 7. Continued

SPECIES	AUDUBON'S	
	NAME	COMMENT
64. Swamp Sparrow	Same	Plentiful
Unidentified Sparrows	Same	Several species
65. *Snow Bunting	Same	
66. *Red-winged Blackbird	Red-winged Starling	Breeds in interior
67. Rusty Blackbird	Rusty Grackle, <i>Quiscalus ferrugineus</i>	Very abundant
68. Pine Grosbeak	Same	
69. White-winged Crossbill	Same	
70. Hoary Redpoll	Mealy Redpoll	Feeding on Bake Apple berries

*Not recorded by Banks for Newfoundland

**Not recorded by Banks or yet confirmed on most recent Newfoundland list (Appendix I)

¹Except for Reeks (1869), who confused this species with Leach's Storm-Petrel, there are no other reports to date (1987).

²Noted in his journal as breeding and as unheard of in his *Ornithological Biography*, Vol. 4?

³Species not known to occur until introductions in 1959-64.

⁴Informants probably referred to snipe, which are widespread and common breeders, rather than to the rare woodcock.

⁵In Vol. 2 of *Ornithological Biography*, "neither in Labrador nor Newfoundland"; in Vol. 5, "common in Labrador and Newfoundland." The earlier account may actually have been written before Audubon visited the region (see, also, Todd, 1963). Interestingly, Yellow-bellied Flycatchers, which are abundant today, were not mentioned.

⁶Also noted Blue Yellow-eyed Warbler in journal, which may have been a misprint for this species.

SYSTEMATIC ORNITHOLOGICAL STUDY, 1833–1900

1835. His early interest in natural history focused on insects, particularly Lepidoptera. He kept a journal of his observations and prepared a manuscript on the entomology of Newfoundland. However, few of his observations were published and his manuscript was lost (Gosse, 1896; Freeman and Wertheimer, 1980).

His interest in ornithology also developed while in Carbonear. He acquired a copy of the Jameson Edition of Wilson and Bonaparte's *American Ornithology* at an auction and also learned avian taxidermy. He was a prolific writer and during his lifetime wrote more than 40 books (see Freeman and Wertheimer, 1980), among which can be found numerous references to Newfoundland birds. His first book, *The Canadian Naturalist* (1840), makes reference to the shooting for food of large numbers of robins in Newfoundland. Although focused elsewhere, the book makes passing reference to the Newfoundland occurrence of the American Bittern (or Inca Hen), Three-toed Woodpecker, Gray Jay, Black-capped Chickadee, robin, Blackpoll Warbler, White-throated and Fox Sparrows, Northern Oriole, Pine Grosbeak, crossbill, and Snow Bunting. Neither Banks nor Audubon had previously reported the Three-toed Woodpecker for Newfoundland. Gosse's precise use of scientific names and careful descriptions of birds are very noteworthy. In 1844 he wrote *An Introduction to Zoology* that contains an illustration of the Great Auk. His greatest ornithological contribution is his book, *The Birds of Jamaica* (1847), which was written after he left Newfoundland and which earned for him the epithet "Father of Jamaican Ornithology" (D. Steele, pers. comm.).

NEWFOUNDLAND BIRDS EXHIBITED IN LONDON BY E. MOORE, 1841

In March 1841 specimens of the Northern Pintail, Blue-winged Teal, Willow Ptarmigan, and Great Black-backed Gull from Newfoundland were exhibited in London by an E. Moore (1841). This person may have been E. L. Moore who was Curator of the Museum of the Agricultural Society in 1848 and the Curator of the Museum of the Athenaeum of St. John's in 1862. Or, he could also have been E. W. Moore who worked in the St. John's Library and Reading Room in 1841 and who was the Assistant Secretary, Treasurer, Librarian, and Superintendent of Rooms in the Athenaeum in 1862. One or both of these people played a role in establishing the early natural history collection that eventually became the nucleus of the Newfoundland Museum (J. Maunder, pers. comm.).

PETER STUWITZ, A NORWEGIAN NATURALIST IN NEWFOUNDLAND, 1839–1842

Like so many naturalists of the 19th century Stuwitz earned a theology degree at the University of Christiania (now Oslo), where he also pursued long-term interests in marine zoology. Following his formal education he worked as a natural historian at the Bergen Museum, which was the fore-

runner of the university there. In 1839 the Norwegian government sponsored Stuwitz's investigation of the North American cod fishery which was competing with Scandinavian fishing industries (Nordvik and Fischer, 1985). He arrived in St. John's on 30 August and on 8 December sailed for St. Pierre and Fortune Bay, where he collected and kept written records of marine and terrestrial animals (Lindroth, 1955, 1957). He returned to St. John's on 2 February 1840, and a month later (3 March) he and Jukes (p. 74) sailed on the brigantine *Topaz* to the seal hunt. He also did some collecting on the Grand Banks, the north coast of the island, the Northern Peninsula, and the Labrador coast. During the course of his work he circumnavigated Newfoundland and was apparently the first naturalist to do so (Montevecchi, 1987).

As a natural scientist Stuwitz kept notes on a diversity of topics that included aboriginal people, botany, meteorology, geography, northern lights, terrestrial and marine invertebrates and mammals, fish, parasites, and birds. In a search of 18 of his 21 Newfoundland and Labrador notebooks that can be located, records of 32 birds have been found (Montevecchi, 1987). All of these species had been recorded by other previous or concurrent workers. Stuwitz was a careful observer and appears to have been the first in Newfoundland to differentiate between the color phases of the Northern Fulmar and to distinguish the bridled form of the Common Murre.

In 1841 Stuwitz was the first scientist to visit Funk Island and to collect Great Auk bones after the species' extinction. He found "enormous heaps" of bones and described the compounds into which the flightless bird had been driven before being slaughtered (Steenstrup, 1855; Milne, 1875; Grieve, 1885; Kirkham and Montevecchi, 1982; p. 147). Stuwitz's collecting trip to Funk Island was the first of many subsequent scientific expeditions there by others. Most of the Great Auk skeletons in existence today were reconstructed from bones obtained on Funk Island. Ironically, there is no complete skeleton in Newfoundland nor, for that matter, elsewhere in Canada.

Stuwitz endured many privations during his expeditions, often sleeping in an open boat during winter. His self-denial apparently took its toll, and he died of consumption in St. John's on 21 June 1842. His extensive collections and diaries, which contain observations about Funk Island, were returned upon governmental request to Norway. Included also were Beothuk artifacts and Great Auk bones. These bones were probably assembled into the Great Auk skeletons that can be found in Scandinavia today. In 1877 Dr. Henry H. Stabb, who had decades earlier examined and packed Stuwitz's belongings for shipment to the University of Christiania, petitioned Newfoundland's Governor Glover to have the notes on the cod fishery returned. This was never carried out, though Nordik and Fiskher (1985) have recently published a paper on Stuwitz's 1840 investigations of the inshore cod fishery (see, also, Montevecchi, 1987). Eighteen of Stuwitz's Newfoundland diaries are now housed at the Riksarkivet (National Archives) of Norway (Oslo) and his family correspondences and student papers are at the Universitetsbib-

lioteketet in Bergen. Three diaries, including the one with information on Funk Island, are not preserved with Stuwitz's other material; their whereabouts are currently under investigation.

HENRY REEKS' HIGHLY CONJECTURAL SPECIES LIST, 1869

Originally from Thruxton in Andover, England, Reeks lived in Cow Head on Newfoundland's west coast from August 1866 through August 1868, for the purpose of ornithological study (Reeks, 1873). His active observation time was, however, cut severely because he was seriously frostbitten during a winter outing, and several of his toes had to be amputated (Reeks, 1869; Bruton, 1927). Reeks made no apparent attempt to save or house the many specimens he collected (Peters and Burleigh, 1951b).

Reeks' publication on Newfoundland birds in the *Zoologist* (1869) was the first such paper to appear in a recognized scientific journal. The report's republication in its entirety in the *Naturaliste Canadien* in 1870, further resulted in wide North American exposure of the paper. Some influential natural historians, such as Moses Harvey (1874, 1875; Hatton and Harvey, 1883), who was not an ornithologist, uncritically accepted and acclaimed Reeks' contribution. The issue was sealed by Macoun (1900, 1903, 1904) who used Reeks' account as the sole authority on the Newfoundland avifauna in his comprehensive catalogue of Canadian birds. These writers thereby, unknowingly, perpetuated the impression that Reeks had produced a benchmark work when, in fact, he had missed a golden opportunity.

Reeks' paper contains many glaring inaccuracies, but the major problem is that conjecture pervades and objective observation cannot be differentiated from hearsay or expectation. The inclusion by him of many undocumented species seems to have been based on their occurrences on the mainland of northeastern North America (Griscom, 1926). Species accounts are often internally inconsistent, as exemplified by the statement that "Brent Geese" (Brant) were "very common" in western and southern Newfoundland but that the only two he observed during his two-year stay were probably Double-crested Cormorants. Lack of careful presentation renders as virtually nil the validity of this partially objective, partially speculative work. Paradoxically, much of Reeks' writing gives clear indication of a keen knowledge of birds. It is unfortunate that he did not make the unprecedented contribution to Newfoundland avifaunal knowledge of which he was apparently capable and with which he has so often been credited.

Our assessment of Reeks' ornithology concurs with the critical appraisals of his informal list of the Newfoundland flora (Reeks, 1873) which have been made by Fernald and other botanists who carried out research in Newfoundland (Ayre, 1937). Reeks' (1870b) writings on the island's mammals seem at quick perusal to be much better founded than his botanical and avian publications.

Owing to the wide attention and acclaim that Reeks' publication received, we have scrutinized it thoroughly. Most scientifically oriented ornithologists

who worked in Newfoundland in the 20th century, and who had a good knowledge of the North American avifauna, either ignored (e.g., Noble, 1919), refuted (e.g., Griscom, 1926), or very seriously questioned (e.g., Peters and Burleigh, 1951b) Reeks' records. Nevertheless, references to this work continue to surface.

Reeks (1869) claimed to have recorded 212 species of birds in Newfoundland. The magnitude of this claim can be weighed upon consideration of the fact that nearly 80 years later Peters and Burleigh (1951b) documented only 215 species. The latter account was based on 304 days of field work over a 10-year period (1937–47) in many parts of the island, a thorough literature review, and searches of museum collections. Although Reeks could conceivably have spent as much or more time than this in the field, and although he did bird in one of the richest avian habitats in Newfoundland, much less was known about field identification and about the North American avifauna in Reeks' time than in Peters and Burleigh's.

Scrutiny of Reeks' (1869) publication is revealing. A tabulation of all species, even those casually mentioned, totals 209 species (Table 8). If one then eliminates those birds that Reeks definitely did not by his own accounts see himself, the total drops to 178. Of these, 29 were not recorded by Peters and Burleigh (1951b), and four are not on the 1986 Newfoundland checklist (Maunder, et al., 1986). Of the 25 species on the most recent checklist that were not reported by Peters and Burleigh (1951b), all except three (including Spruce Grouse, introduced in 1959–64) are of less than uncommon status, viz., very uncommon (2), rare (6), rare vagrant (5), and very rare vagrant (9). Undoubtedly Reeks erred in some, perhaps many, of these instances. Given what we know about present-day occurrences of these unusual birds on the west coast, we can speculate that Reeks may have encountered ten of these 23 locally unusual birds (i.e., Mallard, Greater Scaup, American Kestrel, Hudsonian Godwit, Eastern Wood-Pewee, Least Flycatcher, Cliff Swallow, and Nashville, Bay-breasted, and Canada Warblers. In view of Reeks' other listings, and very probable confusion with some of the more common birds (see below), it seems conservative to subtract another 19 species, which would yield 159 species actually observed. A compilation of even this magnitude was unquestionably an outstanding achievement for the time, but its value is marred by unreliable presentation. In this regard, Reeks' work is different from Audubon's, which was carried out 35 years earlier (p. 83).

Many omissions from Reeks' list are striking in view of the species diversity reported. Unlisted birds that are common around Cow Head today, and were most probably present in the 1860s, include Horned Lark, Golden-crowned Kinglet, Gray-cheeked Thrush, Tennessee Warbler, Northern Waterthrush, Mourning Warbler, and Lincoln's and Swamp Sparrows. Audubon had noted Golden-crowned Kinglets and Lincoln's Sparrows during his brief visit to the west coast 30 years earlier than Reek. Omissions from Reeks' list are indicative of groups where he encountered difficulty. For instance, the inclusion of Chestnut-sided Warbler, a rare vagrant today, but the omis-

TABLE 8. List of birds of insular Newfoundland derived from Reeks (1869).

SPECIES	REEKS'	
	NAME	COMMENTS
1. Red-throated Loon	Redthroated Diver	Nesting generally in some smaller ponds [see, also, Cormack; p. 71]
2. Common Loon	Loon, Great Northern Diver	Nearly every lake and large pond occupied by a pair
3. Northern Fulmar	Fulmar Petrel	
4. Greater Shearwater		
5. Sooty Shearwater		
6. Manx Shearwater		
7. Wilson's Storm-Petrel	Wilson's Stormy Petrel	Via hearsay, said to nest [inaccurate, see next entry]
8. Leach's Storm-Petrel	Leach's Petrel	[Reeks misidentified, at least with regard to nesting, this species for Wilson's and British Storm-Petrels]
		Very common summer migrant; prey on mackerel and herring
9. Northern Gannet	Common Gannet	Very abundant at some breeding sites
10. Great Cormorant	Common Cormorant	Said to breed in trees in Hawk's Bay
11. Double-crested Cormorant		Only heron seen; arrive early May, leave end Sept.
12. American Bittern		"Only saw 1 specimen, which was an adult . . . flying, south in fall of 1867"
13. *Tundra Swan	American Swan <i>Cygnus columbianus</i>	Very rare
14. *White-fronted Goose	American White-fronted Goose	Very rare [apparently listed by hearsay and not seen by Reeks]
15. *Snow Goose		Very common in south and west Nfld. [claimed this but apparently saw none in 2 yrs; see text]
16. Brant	Brent Goose	Arrives in April/May by "countless thousands"; northern migrants much darker on breast called "little blackbreasted northerners"; light gray down on males, dark grey (almost black) on females
17. Canada Goose		Appears to be common teal of island
18. Green-winged Teal		Common wild duck of Island; very shy, not easily approached except from leeward
19. American Black Duck		

TABLE 8. Continued

	SPECIES	REEKS'	
		NAME	COMMENTS
20.	*Mallard	same, Common Wild Duck	Very rare; examined specimen
21.	Northern Pintail	Pintail Duck	Very rare
22.	Blue-winged Teal		Rare; probably nowhere as common as Green-winged Teal
23.	*Gadwall	Gadwall; Gray Duck	Rare; does not breed; occasionally killed
24.	American Wigeon	Baldpate, American Widgeon	Common summer migrant
25.	Ring-necked Duck		Rare
26.	*Greater Scaup	Scaup Duck, Big Blackhead	Very rare straggler to NW coast
27.	Lesser Scaup	American Scaup Duck	Rarely seen
28.	Common Eider	American Eider Duck	Most abundant duck in Nfld; nos. diminished in recent yrs. owing the egg; several 100s on islands in St. Paul's Bay.
29.	King Eider		Tolerably common during migration
30.	Harlequin Duck		Common summer migrant
31.	Oldsquaw	Long-tailed Duck	Very common on coast in fall/spring; thought not to nest
32.	Black Scoter	American Scoter	Very common throughout year
33.	Surf Scoter	Surf Duck	Common especially during migration
34.	White-winged Scoter	Velvet Scoter	Common; flocks probably of immatures seen throughout summer
35.	Common Goldeneye	American Golden Eye	Very common summer migrant
36.	Bufflehead	Buffel-headed Duck; Butter Ball	Rare
37.	Hooded Merganser		"Apparently rare on NW coast; generally obtained in . . . immature plumage"
38.	Common Merganser	Goosander	Tolerably common, summer migrant; breeder
39.	Red-breasted Merganser		Very common summer migrant; fly to sea in early AM, return to freshwater in PM
40.	Ruddy Duck		Rare, uncertain visitor on NW coast

41.	Osprey	American Osprey, Fish Hawk	Common summer migrant; arrives in May, departs early Oct.
42.	Bald Eagle	Whiteheaded Eagle	Tolerably common
43.	Sharp-shinned Hawk		Summer migrant; not uncommon
44.	*Cooper's Hawk		Summer migrant; not uncommon [Reeks possibly confused Cooper's with Goshawk or Sharp-shinned Hawk]
45.	*Red-tailed Hawk		Summer migrant; not so common as on mainland; "examined 1 specimen shot in Nfld." [rare bird today]
46.	Rough-legged Hawk	Black Hawk	Common, particularly in immature plumage; reared a dark-phased Rough-legged Hawk [Reeks called it Buzzard; appears that he inaccurately distinguished the two color phases of Rough-legged as different species]
*47.	American Kestrel	American Sparrow Hawk	Summer migrant; less common than Pigeon Hawk
48.	Merlin	Pigeon Hawk	Tolerably common summer migrant; preys on small birds, especially shorebirds
49.	Gyr Falcon (white phase)	Greenland Falcon	Pretty regular during migration, especially in fall; do not think it breeds
50.	*Spruce Grouse	Canada Grouse, Spruce Partridge	Very rare, uncertain visitor from mainland; 2 killed, 2 seen by residents during my stay [also reported by Audubon; no other records until 1964 when species introduced]
51.	Willow Ptarmigan	Willow Grouse	Common
52.	Rock Ptarmigan		Truly alpine, rarely found below line of stunted black spruce except in midwinter
53.	Virginia Rail		Summer migrant; apparently rare; saw only 1 specimen
54.	Sora	Common American Rail	Summer migrant; probably more common than Virginia Rail [same relative abundance today]
55.	Semipalmated Plover		Summer migrant; breed on coast
56.	Piping Plover	Same, Ring Plover	Appears to be a common fall migrant; congregates in large flocks

TABLE 8. Continued

	SPECIES	REEKS'	
		NAME	COMMENTS
57.	Black-bellied Plover	Same, Grey Plover	Very common in fall; did not see in spring
58.	Lesser Golden Plover		Abundant in fall migration; very rare, if at all in spring [same today]
59.	Killdeer		Not as common as Golden Plover in fall
60.	Greater Yellowlegs	Tell Tale, Stone Snipe, <i>Gambelia melanoleuca</i>	Summer migrant; less common than Lesser [evident from text that Reeks may have confused Greater & Lesser Yellowlegs]
61.	Lesser Yellowlegs	Yellow Legs, Yellow shanked Sandpiper, <i>G. flavipes</i>	Summer migrant; arrive May, depart Oct.
62.	Solitary Sandpiper		Not uncommon late summer
63.	Willet		Common, especially in fall or immature plumage
64.	Spotted Sandpiper		Common summer migrant; arrives early May
65.	*Upland Sandpiper	Bartram's Sandpiper <i>Actitis</i> <i>Bartramius</i>	
66.	Eskimo Curlew	Esquimaux Curlew	Most common curlew; comes by 1000s in fall, end Aug. to end Sept.; very rare in spring; feed on <i>Empetrum nigrum</i> berries
67.	Whimbrel	Hudsonian Curlew	Visits during migration; does not breed; confused by residents with Longbilled Curlew [this may be Reeks' confusion; see Longbilled Curlew below]
68.	*Hudsonian Godwit		Visits; most common fall; much appreciated dinner bird
69.	*Marbled Godwit		Periodic visitors; most common in fall [only 2 other records to 1987]
70.	Ruddy Turnstone	Turnstone	Abundant in fall
71.	Red Knot	Gray Back, Robin Snipe, Knot	Visits in migration
72.	Sanderling		Visits in fall
73.	Semipalmated Sandpiper		Common in fall

74.	Least Sandpiper	American Jack Snipe, <i>Tringa maculata</i>	Common summer migrant
75.	White-rumped Sandpiper	Bonaparte's Sandpiper, <i>Tringa schinzi</i>	Tame fall flocks, up to 20 may be killed with a shot; preyed on by Merlins [probably White-rumped Sandpipers, the only common shorebird not otherwise mentioned] Rather rare summer migrant; most common in other seasons
76.	Purple Sandpiper		
77.	Dunlin	American Dunlin	Summer migrant; more common in fall
78.	*Stilt Sandpiper		Not common; killed 1 on Sept. 1867
79.	Buff-breasted Sandpiper		Not very common summer migrant; think it nests [it does not; summer/fall vagrant]
80.	Short-billed Dowitcher	Gray Snipe	Common summer migrant; implied breeding [not known to breed]
81.	Common Snipe	Wilson's Snipe	Common summer migrant arrives about end April & soon breeds; male aerial displays while female incubates
82.	European Woodcock		[Listed on basis of 1862 report in <i>Ibis</i>]
83.	Red Phalarope		Visits generally in June [erroneously considered Red & Red-necked Phalaropes to be different seasonal plumage types of a single species]
84.	Pomarine Jaeger	Pomarine Skua	Common, especially in fall
85.	Parasitic Jaeger	Arctic Skua	Most common in spring & fall
86.	Long-tailed Jaeger	Buffon's Skua	Rather rare periodical migrant
87.	Ring-billed Gull		Common throughout summer
88.	Herring Gull		Abundant
89.	Iceland Gull		Most common in fall
90.	Glaucous Gull	White-winged Gull	Tolerably common in migration, especially in fall & NW gales
91.	Great Black-backed Gull		Common summer migrant; arrives end April
92.	Black-legged Kittiwake	Kittiwake Gull	Tolerably common
93.	Sabine's Gull	same, Fork-tailed Gull	Periodic visitor; not common
94.	Ivory Gull		Very rare periodical migrant on NW coast
95.	Caspian Tern		Tolerably common summer migrant; breeds on many coastal islands [local breeder today]

TABLE 8. Continued

SPECIES	REEKS'	
	NAME	COMMENTS
96. Common Tern	Wilson's Tern	Most abundant tern; arrives early June
97. Arctic Tern		Rare
98. **Least Tern		Apparently very rare; 1 specimen shot 10 Sept. 1867
99. Dovekie	Little Auk	Common periodic migrant; arrives Oct.
100. Common Murre	same, Common Guillemot	Breeds extensively on islands on NE coast
101. Thick-billed Murre	Thick-billed Guillemot	
102. Razorbill	Razor-billed Auk	Common summer/fall
103. Black Guillemot		Very common
104. Atlantic Puffin	Common Puffin	Common summer; most abundant fall
105. *Barn Owl	American Barn Owl	Apparently rare; examined 1 specimen shot Aug. 1866 [only 1 other record, a specimen from St. Anthony, 1957]
106. **Eastern Screech-Owl	American Screech Owl, Mottled Owl	Tolerably common summer migrant
107. Great Horned Owl		Nests; not very common
108. Snowy Owl		Tolerably common; very rare in summer; considered good eating [agreed to by B. Mactavish, pers. comm.]
109. Northern Hawk-Owl		Most frequently sighted owl
110. **Barred Owl		Summer migrant; not common 1 specimen shot
111. **Long-eared Owl	American Longeared Owl	Not common; 1 specimen [only 2 other possible sightings]
112. Short-eared Owl		Not common
113. Saw-whet Owl	American Short-eared Owl	Not uncommon; 1 specimen
114. Chimney Swift	American Chimney Swallow	Apparently rare; 1 specimen
115. Belted Kingfisher		Tolerably common in summer
116. Downy Woodpecker	same, Sapsucker	Very common
117. Hairy Woodpecker	same, Sapsucker	Tolerably common; specimens . . . agree with Baird's variety

118.	Threc-toed Woodpecker	Banded Threetoed Woodpecker	Less common than next species
119.	Black-backed Woodpecker	Flicker	Tolerably common
120.	Northern Flicker	Wood Pewee	Tolerably common
121.	*Eastern Wood Pewee		Uncommon summer migrant; arrives May
122.	Yellow-bellied Flycatcher		Apparently common summer migrant; arrives May
123.	**Acadian Flycatcher	Greencrested Flycatcher, <i>Empidonax acadicus</i>	Not very common migrant; frequents woods near houses
124.	*Least Flycatcher	Pewee, <i>Sayornis fuscus</i>	Summer migrant; specimen obtained
125.	*Eastern Phoebe	King Bird, Bee Martin	Not common
126.	Eastern Kingbird		Nests; tolerably abundant
127.	*Purple Martin		Appears rare; 1 shot
128.	Tree Swallow	Whitebellied Swallow	Very common summer migrant; only swallow seen throughout summer
129.	Bank Swallow	Same, Sand Martin	Very rare; said to be common about Bay St. George and further south [nest in this area]
130.	*Cliff Swallow		Rare summer migrant
131.	Barn Swallow		Rare summer migrant
132.	Gray Jay	Canada Jay	
133.	Blue Jay		Uncommon summer migrant
134.	American Crow		Arrives April
135.	Common Raven	American Raven	
136.	Black-capped Chickadee	Blackcap Titmouse	
137.	Boreal Chickadee	Hudsonian Tit	
138.	Red-breasted Nuthatch	Redbellied Nuthatch	
139.	Brown Creeper	American Creeper	Rare but perhaps resident; specimen
140.	Winter Wren		Uncommon summer migrant
141.	Ruby-crowned Kinglet	Rubycrowned Wren	Not uncommon; arrives in May
142.	Veery	Wilson's Thrush	Less common than Hermit Thrush
143.	Swainson's Thrush	Olivebacked Thrush	Less common than Hermit Thrush
144.	Hermit Thrush		Arrives mid-May; tolerably good songster
145.	American Robin	Same, Migratory Thrush	Arrives April; eggs early May
146.	Water Pipit	American Tit Lark <i>Anthus ludovicianus</i>	Do not think it breeds; seen only in migration Aug. [breeds in Nfld.]

TABLE 8. Continued

	SPECIES	REEKS'	
		NAME	COMMENTS
147.	Northern Shrike	Great Northern Shrike, American Butcher Bird	Appears rare; may nest [no nest record as of 1987]
148.	Yellow-throated Vireo	Yellow-throated Flycatcher <i>Vireo flavifrons</i>	Tolerably common summer migrant, arrives June [apparent misidentification of Solitary, Red-eyed, or Philadelphia Vireos which occur uncommonly today and which Reeks did not mention. Yellow throated Vireos' are very rare fall migrants] Apparently rare summer migrant; specimen
149.	*Nashville Warbler		
150.	Yellow Warbler		
151.	*Chestnut-sided Warbler		
152.	Magnolia Warbler		Tolerably common throughout summer [very rare summer migrant] Arrives May; tolerably common
153.	Yellow-rumped Warbler	Black and Yellow Warbler,	Common summer migrant; arrives early May
154.	Black-throated Green Warbler	<i>Dendroeca maculosa</i>	Tolerably common summer migrant; arrives about end of May
155.	Palm Warbler	Yellow Red-poll Warbler	1 of earliest spring migrants; tolerably common
156.	*Bay-breasted Warbler		Tolerably common; arrives early June
157.	Blackpoll Warbler		Apparently not uncommon
158.	Black-and-white Warbler	Black and White Creeper	Apparently common
159.	American Redstart		Rare northern Nfld.; arrives mid May
160.	Ovenbird	same, Golden-crowned Thrush	Uncommon
161.	Common Yellowthroat	Maryland Yellowthroat	Common
162.	Wilson's Warbler	Green Black-cap Flycatcher, <i>Myiodyctes pusillus</i> (Wilson)	Uncommon; arrives in June
163.	*Canada Warbler	Canada Flycatcher, <i>M. canadensis</i>	Uncommon; arrives June
164.	Chipping Sparrow		Abundant
165.	Savannah Sparrow		Very common; breeds on ground and in low bushes
166.	Fox Sparrow	Fox-coloured Sparrow	

167.	White-throated Sparrow	Very common; arrives end of May
168.	White-crowned Sparrow	Common; arrives May
169.	Dark-eyed Junco	Tolerably common; arrives end May
170.	Snow Bunting	Good many observed in June 1868
171.	Rusty Blackbird	Common; generally staying until after first snow
172.	Common Grackle	Rare
173.	Pine Grosbeak	Common; more abundant in winter, when they group in small flocks of about 2 broods; very tame often killed with sticks
174.	Red Crossbill	Common; early nester
175.	White-winged Crossbill	Common; more abundant in winter flocks of 5-20; feed mostly on white spruce cones
176.	Common Redpoll	Very common; breeds early, generally in alder bushes
177.	Pine Siskin	
178.	American Goldfinch	Common

OTHER SPECIES MENTIONED BUT NOT OBSERVED BY REEKS

1.	Grebe sp.	<i>Podiceps</i>	"Caught in the marshes near Cow Head . . . year or two before I got there . . ."
2.	**British Storm-Petrel	Stormy Petrel, Mother Carey's Chicken, <i>Thalassidroma pelagica</i>	[Probable misidentification of Leach's Storm-Petrel]
3.	European Wigeon	English Widgeon	"Not improbable that this species occasionally occurs in Newfoundland"; not observed [rare vagrant]
4.	*Northern Shoveler	Shoveller	Unseen bird [apparent misidentification based on residents' "pond diver"; shovelers are dabbling ducks]
5.	*Redhead	<i>Aythya americana</i>	Not seen; "reasonably . . . expected to occur in Newfoundland"
6.	*Canvasback	<i>Aythya vallisneria</i>	Not seen; "reasonably . . . expected to occur in Newfoundland"
7.	*Labrador Duck		Not seen
8.	Golden Eagle	<i>Aquila canadensis</i>	Not improbable that it may eventually be found to visit [it has]

TABLE 8. Continued

	SPECIES	REEKS'	
		NAME	COMMENTS
9.	Goshawk	American Goshawk	Not seen; included on basis of statements of residents
10.	Northern Harrier	American Hen Harrier	No specimen; possibly saw
11.	Peregrine Falcon	Duck Hawk	Expected and probably occurs [it does]
12.	Gyrfalcon (dark phase)	Iceland Falcon	[Inappropriately considered light- and dark-phases to be different species]
13.	Crane sp.	Brown Crane, <i>Grus</i> sp.	Informed a "brown crane" killed [unlikely to have been crane, more likely heron which is often called crane in Nfld.]
14.	*Black-necked Stilt	<i>Himantopus nigricollis</i>	Not seen, may be expected periodically
15.	**American Avocet	<i>Recurvirostra americana</i>	Same comments as above
16.	**Long-billed Curlew		Periodic migrant, sought by hunters who imitate its call [apparent misidentification; also made by Bonnycastle]
17.	American Woodcock		Not seen; probably occurs as a summer migrant [correct speculation]

18. Laughing Gull	American Black-headed Gull	Possible visitor
19. Bonaparte's Gull		May occur in Straits of Labrador
20. Puffin	<i>Mormon glacialis</i>	Said to be a larger puffin in fall
21. Great Auk		Talked to old residents who had seen them on west coast
22. Columbidae (Doves)		None seen
23. Passenger Pigeon	<i>Ectopistes migratoria</i>	May prove to be an occasional straggler
24. Boreal Owl	Sparrow Owl	Not seen
25. Common Nighthawk	American Night Hawk	Not seen
26. **Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	
27. Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	
28. **Red-bellied Woodpecker	<i>Centurus carolinus</i>	"Probably occur"; not seen; [neither Red-headed nor Red-bellied on latest checklist; see Appendix I]
29. Pileated Woodpecker	Black Woodcock, Log Cock	Not seen; "great black woodpecker" of settlers
30. Eastern Bluebird	Blue Bird	Not seen
31. Cedar Waxwing	<i>Ampelis cedrorum</i>	Not seen; correctly speculated to occur

*Species not listed in Peters and Burleigh (1951).

**Those species not listed in former work or in the most recent checklist of Newfoundland birds (Appendix I).

sion of the three common warblers listed above is inexplicable, as is the omission of the common sparrows. Owls also posed major problems. Reeks recorded Common Barn Owl, Eastern Screech Owl, Barred Owl, and Long-eared Owl. The last three owls are not on the latest checklist, and there is only a single record of barn owl, although Audubon had also reported the Screech and Barred Owls (Table 8). Moreover, the Boreal Owl, a species expected in view of the diversity of owls mentioned, was not recorded. Flycatchers were also problematic; the Eastern Wood-Pewee, Acadian Flycatcher, Least Flycatcher, and Eastern Phoebe were listed. Of these, the Acadian is not on the latest checklist; there is one hypothetical record for the phoebe, and the Least Flycatcher and pewee are rare. Neither of the more common Alder and Olive-sided Flycatchers was recorded.

Despite our criticism, many of Reeks' observations appear accurate and keenly perceptive. Without access to the field guides or local ornithological information that was readily available to later workers, it is inevitable that some species would have been misidentified. Yet, even taking these considerations into account, the overriding fact remains that Reeks' uncritical publication has created confusion and misrepresentation for subsequent ornithologists that far outweigh its positive aspects.

Not all ornithologists share our opinion of Reeks' publication. Following an intensive avifaunal survey in Gros Morne National Park, in the immediate vicinity of where Reeks worked, Lamberton (1976a) suggested that had subsequent ornithological observation been carried out in the area, Reeks' paper (1869) would have become a classic. As will be clarified below and in the next chapter, almost all of the early ornithologists after Reeks, for example, Merriam, Cahoon, Doane, Colburn, Potter, Porter (1900), Brown (1911, 1912), Arnold (1912), Oberholser (1914), Noble (1919), Griscom (1926) worked in western Newfoundland, and none substantiated Reeks' claims. Lamberton (1976a:vii) dedicated his study to Reeks and wrote, "It is my opinion that Reeks gives us an almost entirely accurate account of the birds of western Newfoundland in his day." While many of Reeks' observations are impressive, we can find no basis to support Lamberton's generalization.

REVEREND MOSES HARVEY

In an article entitled "The birds of Newfoundland" that appeared in *Forest and Stream*, Harvey (1874–75) popularized Reeks' (1869) account of the island's avifauna. Nothing new was added, and Harvey simply reiterated many of Reeks' errors (see, also, Hatton and Harvey, 1883).

Harvey encouraged John Milne to visit Funk Island, and also influenced Professor Spencer Fullerton Baird of the U.S. National Museum in Washington, D.C. to organize a U.S. Fish Commission expedition to Newfoundland, Labrador, and the Gulf of St. Lawrence. The purpose of the cruise was the collection of fisheries and natural history information, and included the procurement of Great Auk remains from Funk Island (Harvey, 1892; p. 113).

LUDWIG KUMLIEN AND THE ARCTIC CRUISE OF 1877–1878

The naturalist on the Howgate Arctic Expedition of 1877–78, Kumlien sailed along Newfoundland's west coast in August 1877 during the northward cruise, and visited St. John's on the return voyage (26 September–11 October 1878). Kumlien is perhaps best known to ornithologists because his name is associated with the Canadian arctic race of the Iceland Gull (*kumlieni*) designated by Brewster (1883) on the basis of an adult that Kumlien collected on Cumberland Sound near southeastern Baffin Island.

During the voyage Kumlien (1879) reported (a) jaegers common in the Strait of Belle Isle in August 1877, (b) hundreds of Great Black-backed Gulls daily in St. John's Harbour in October 1878, (c) White-winged Crossbills very common about the head of Conception Bay, and (d) collecting an adult male American Goldfinch on board ship off Cape Mugford, Labrador on 22 August 1877, the first provincial record. A White-breasted Nuthatch was also reported "off the Newfoundland Coast" on 22 October 1878; the ship, however, was actually in Nova Scotia waters, as Kumlien noted his southward-bound boat to be "somewhere off Sable Island" on 19 October. This species is not on the latest Newfoundland checklist.

LATE NINETEENTH CENTURY COLLECTORS

In an effort to classify, catalogue, and systematically document specific and subspecific variation, late 19th century ornithologists were preoccupied with specimen collection. Such tasks were primarily undertaken by men of means, who often provided opportunity for others, with a keen knowledge of birds and a sharp aim to travel to out of the way places, to partake in the outdoor life and earn a living of sorts. Many collectors remained relatively unknown to the general public because they worked under contract for others, who owned the material and frequently published major findings. Here we examine their Newfoundland contributions, which greatly enlarged the base of North American avifaunal knowledge.

The crude 18th century techniques of specimen preservation were replaced in the 19th century with methods that insured the permanency of bird skins. As a consequence, it was no longer necessary for artists to accompany collectors into the field in order to document newly discovered forms. The permanent preservation, housing, and cataloging of specimens established new ground rules for ornithology. Problems like those encountered in Reeks' accounts were no longer an issue; specimens were required for confirmation by scientific skeptics; a bird in the hand was worth two in the bush.

Ornithologists led the way in zoogeographic study. The peculiarities of insular faunas, attributed by evolutionary theory to selective pressures acting on reproductively isolated populations, were topics of such investigations. Newfoundland was relatively accessible to biologists from institutions in the northeastern United States and England, and attracted many collectors, es-

SYSTEMATIC ORNITHOLOGICAL STUDY, 1833–1900

pecially in the late 1800s when biogeographic study was in vogue. Most of Newfoundland's initial bird specimen records were obtained, and many insular subspecies were described, during this period of intensive collecting. Despite the limited diversity of Newfoundland's breeding birds, the island has proven rich in racial variation (see Burleigh and Peters, 1948; Peters and Burleigh, 1951b; Bond, 1962; p. 137).

After Merriam's, Welch's, and Stejneger's early efforts, Cahoon, Bigelow, Doane, and Colburn were primarily responsible for the proliferation of avifaunal documentation in the late 1800s. The accomplishments of the most productive late 19th century bird collectors are summarized in Table 9. Cahoon's contribution in terms of the number of first specimen records and skins far exceeded those of all other collectors combined. The work of each of these collectors, and those of Potter, Sornborger, and Bangs are considered in turn in this section. The sites where significant collections have been made in Newfoundland are summarized in Table 10 and shown in Figure 17.

Newfoundland bird specimens are widely scattered today. The bulk, however, have remained in northeastern North America, especially at the Museum of Comparative Zoology, Harvard University. Other institutions housing Newfoundland specimens include the American Museum of Natural History, the Carnegie Museum, and the British Museum (Natural History). Owing to efforts by J. P. Howley and Gower Rabbitts, a bird collection was accumulated in the St. John's Museum in the early part of the 20th century. However, the dissolution of the museum in 1934 led to the destruction of

TABLE 9. Accomplishments of late 19th century collectors in Newfoundland.

COLLECTOR	SPECIES SPECIMEN RECORDS				NO. SPECIMENS LOCATED ^c
	FIRSTS ^a	SECONDS ^b	THIRDS	FOURTHS	
J. C. Cahoon	92	15	0	1	1207
H. L. Bigelow	8	35	4	0	152
A. E. Colburn	7	25	27	5	317
E. B. Doane	6	7	8	5	172
R. B. Potter	2 ^d	11 ^e	12 ^f	1	105 ^g

^aFirst specimen (or series) of a species; excludes collections before 1800, for which specimens no longer exist.

^bSecond specimen (or series) of a species by a collector not involved in the initial specimen collection.

^cRepresent minimum numbers. Based primarily on specimens in the Museum of Comparative Zoology, Harvard University, where most first Newfoundland specimens are housed, and on specimen lists obtained from other major North American natural history museums.

^dBoth jointly credited on specimen labels to Colburn also.

^eNine jointly credited on specimen labels to Colburn also.

^fEleven jointly credited on specimen labels to Colburn also.

^gMany collected with Colburn.

SYSTEMATIC ORNITHOLOGICAL STUDY, 1833–1900

TABLE 10. Newfoundland sites where ornithologists have made important collections or collected noteworthy specimens.

SITE	COLLECTOR	DATE
*1. Cape Bauld	V. Wynne-Edwards	July 1935
	H. Peters/T. Burleigh	June 1943
2. White Islands	H. Peters/T. Burleigh	June 1943
3. St. Lunaire Bay	H. Peters/T. Burleigh	June 1943
4. St. Anthony & vicinity	C. Townsend	Spring 1905
	O. Bryant	1905, 1906
	O. Austin Jr.	July 1928
	E. Loomis	1936–44
	A. Gross	July 1932
	H. Peters/T. Burleigh	June 1943
	S. Christian	1947
	M. McNeil	Nov. 1955
5. Hare Bay	J. Banks	June 1766
	O. Bryant	Feb. 1906
	H. Peters/T. Burleigh	July 1943
6. Great Cormorandier Island	H. Peters/T. Burleigh	July 1943
7. Croque	J. Banks	Jun.–Aug., Oct. 1766
8. Roddickton	H. Peters/T. Burleigh	June 1943
9. Gray Islands	G. Cartwright	Aug. 1771
	H. Savage	July 1968
10. Englee	H. Peters/T. Burleigh	June 1943
11. Canada Bay	W. Palmer	Aug. 1887
	O. Bryant	Apr. 1906
12. Harbour Deep	H. Peters/T. Burleigh	June 1943
13. Jackson's Arm	H. Peters/T. Burleigh	June 1943
14. Hampden	D. Locke	Dec. 1967
15. Adies Pond	A. Colburn/R. Potter	Feb.–July 1894
16. Upper Humber River	A. Colburn/R. Potter	Feb.–Aug. 1894
17. Cormack	L. Tuck	Oct. 1959
	H. Ouellett/R. Poulin	June 1981
18. Nicholsville	G. Noble	Summer 1915
19. Deer Lake	A. Colburn/R. Potter	Feb.–July 1894
20. Pasadena/S. Brook	H. Peters/T. Burleigh	Spring–Summer 1972
21. Humber River	A. Colburn/R. Potter	Feb.–July 1894
22. Corner Brook & vicinity	W. Todd	July 1901
23. Grand Lake	A. Atkinson/W. Todd	July 1901
	J. Whittaker	1913–1925
	A. Bent	1919
24. Howley	W. Todd	July, Aug. 1901
25. Sandy Lake	D. Atkinson/W. Todd/ G. Mellor	July 1901
	A. Bent	June 1912, June 1919
26. Gaff Topsail	E. Arnold	June 1913
	F. Hersey	Sept., Oct. 1913
	H. Peters/T. Burleigh	June 1942
27. LaScie	H. Peters/T. Burleigh	June 1943

SYSTEMATIC ORNITHOLOGICAL STUDY, 1833-1900

TABLE 10. Continued

SITE	COLLECTOR	DATE
28. Badger	A. Cameron/L. Duncan- son/S. Bleakney	June, July 1949
29. Notre Dame Bay	H. Peters/T. Burleigh	July 1942, July 1945
30. Exploits River	H. Savage	July 1968
31. Great Ratting Brook	K. Rooke	Aug.-Sept. 1934
32. Norris Arm	H. Bigelow/J. Cahoon	Aug.-Sept. 1890
33. Bay of Exploits	H. Bigelow/J. Cahoon	July-Sept. 1890
34. Change Islands	H. Peters/T. Burleigh	June 1945
35. Glenwood	A. Cameron/L. Duncan- son/S. Bleakney	June, July 1949
36. Gander	H. Peters/T. Burleigh L. Tuck	June 1942, Apr. 1949 June 1949, Oct. 1966
37. Soulis Pond, Benton	W. Carrick	Nov., Dec. 1942
38. Gambo	H. Peters/T. Burleigh	June 1942
39. Little Fogo Island	H. Peters/T. Burleigh	July 1943
40. Fogo Island	G. Cartwright O. Bryant H. Peters/T. Burleigh J. Maunder	Sept. 1771 Summer 1905, 1906 July 1945 1976
41. Wadham Island	H. Peters/T. Burleigh	July 1945
42. Funk Island	P. Stuwitz F. Lucas/W. Palmer J. Sornborger O. Bryant E. Gilliard H. Peters/T. Burleigh L. Tuck D. Pimlott W. Montevecchi	31 June 1841 23 July 1887 ca. 1900 ca. 1906 June 1936 5 July 1945 Summers 1951-72 Summer 1956 1976-86
43. Penguin Island	F. Lucas/W. Palmer H. Peters/T. Burleigh	July 1887 July 1943
44. Cape Freels	H. Peters/T. Burleigh	July 1945
45. S. Cabot Island	H. Peters/T. Burleigh	July 1945
46. Bonavista Bay	F. Lucas/W. Palmer H. Peters/T. Burleigh S. Gorham	July, Aug. 1887 July 1945 June 1961
47. Salvage & vicinity	S. Oakley	1898-1900
48. Princeton	H. Peters/T. Burleigh	June 1942
49. N. Bird Island	H. Peters/T. Burleigh	June 1942
50. Catalina	H. Peters/T. Burleigh	Summer 1945
51. Clarendville	H. Peters/T. Burleigh	June 1942
52. Random Island	H. Peters/T. Burleigh	July 1943, July 1945
53. Trinity Bay	H. Peters/T. Burleigh L. Tuck D. Locke	June 1945 Jan. 1952 Winter 1967-68
54. Rantem	D. Atkinson	Sept. 1901
55. Hants Harbour	L. Tuck	Mar. 1951
56. Baccalieu Island	J. Sornborger	1897
57. Brigus, Conception Bay	O. Bryant D. Nutt	Summers 1905, 1906 1937, 1938, 1939

SYSTEMATIC ORNITHOLOGICAL STUDY, 1833–1900

TABLE 10. Continued

SITE	COLLECTOR	DATE
58. Whitbourne	H. Peters/T. Burleigh	Spring, Summer 1942
59. St. John's & vicinity	H. Peters/T. Burleigh	June, July 1943
	J. Banks	May, June, Oct. 1766
	P. Stuwitz	1839–42
	C. Merriam	May 1883
	W. Palmer	June 1887
	S. Oakley	Dec. 1894
	E. Doane	1895
	H. Oberholser	1928
	J. Ewing	1930
	E. Brooks	July–Aug. 1932
	K. Rooke	Summer 1934
	W. Carrick	May, June 1943
	W. Templeman	Dec. 1945
	H. Peters/T. Burleigh	Jan. 1947, May 1948
	L. Tuck	1950–75
60. Witless Bay	H. Peters/T. Burleigh	July 1942, Jan., June, July 1943
	W. Templeman	Oct. 1943
	L. Tuck	1950s–1970s
	W. Threlfall	1960s–1980s
	D. Nettleship	1960s–1980s
61. Cape Broyle vicinity	S. Peters	July 1955
62. Ferryland	L. Tuck	June 1954
63. Grand Banks	J. Collins	Nov. 1878
	U.S. Fish Comm.	Oct. 1886
	J. Cahoon	Sept.–Nov. 1889
	H. Peters/T. Burleigh	Summer 1945
	S. Gorham	Sept. 1961
64. off Cape Race	W. Todd	Oct. 1926
	D. Nutt	Aug. 1938
65. St. Shotts	H. Peters/T. Burleigh	1940s
66. St. Mary's Bay	D. Nutt	Sept. 1939
67. Point Lance	J. Cahoon	Apr. 1891
68. Cape St. Mary's, Cape Shore	J. Cahoon	May 1889–April 1891
	H. Bigelow	June–Nov. 1890
	H. Peters/T. Burleigh	June 1942
69. Placentia Bay	W. Templeman	Aug. 1939
70. Little Salmonier River	D. Gillespie	July 1967
71. Placentia	J. Banks	May 1766
	J. Cahoon	June–July, 1889, May, June, Sept. 1890
	H. Peters/T. Burleigh	June, Sept. 1941, Jan. 1947
72. Argentia & vicinity	L. Tuck	May–Sept. 1947
	H. Peters/T. Burleigh	Sept. 1947
73. Green & St. Pierre Banks	J. Cahoon	Sept. 1889
74. Green Island	H. Peters/T. Burleigh	July 1945
75. Dantzic Point	H. Peters/T. Burleigh	July 1945

SYSTEMATIC ORNITHOLOGICAL STUDY, 1833-1900

TABLE 10. Continued

SITE	COLLECTOR	DATE
76. Grand Beach	H. Peters/T. Burleigh	July 1945
77. Recontre East	H. Peters/T. Burleigh	July 1945
78. Fortune Bay	P. Stuwitz	Dec. 1839-Jan. 1841
79. Gray River	H. Peters/T. Burleigh	June 1943
80. Columbier Island, Ramea	H. Peters/T. Burleigh	July 1945
81. White Bear Bay	H. Peters/T. Burleigh	July 1945
82. Burgeo & vicinity	W. Palmer	June 1903
	W. Palmer	June 1903
	L. Tuck	Sept.-Oct. 1958
83. Wreck Island, Garcia Bay	H. Peters/T. Burleigh	July 1945
84. Grand Bruitt	H. Peters/T. Burleigh	July 1945
85. Rose Blanche	H. Peters/T. Burleigh	July 1945
	A. Parish	1946-50
86. Cape Ray	F. Hersey	Sept. 1913
	H. Ouellett/R. McNeil	July 1959
87. Codroy Valley	E. Doane	1893-98
	H. Peters/T. Burleigh	July 1943, Summer 1944, 1945
		Sept. 1946, Feb. 1947
	T. Burleigh/J. Denton	May 1947
	L. Tuck	Summers 1956-59
	H. Ouellett/R. McNeil	June, Aug., Sept. 1959
	J. Risling/F. Schueler	June 1972
	H. Ouellett/R. Poulin	June 1981
88. Cape Anquille	H. Peters/T. Burleigh	Sept. 1946
	H. Ouellett	July 1959
89. St. George's Bay	J. Audubon	Aug. 1833
	J. Cahoon	Jan., Dec. 1890
	E. Doane	1893-98
	W. Todd	July 1901
	E. Arnold/W. Brown	Summers 1911, 1912
	A. Bent	June 1912
	L. Sanford	July 1912
	H. Peters/T. Burleigh	June 1943
	H. Ouellett/R. Poulin	June 1981
90. Stephenville Crossing	R. Howe	July 1911
	H. Peters/T. Burleigh	Sept. 1941, Aug. 1944 Summer 1945, Sept., Oct. 1946
	H. Ouellett/R. McNeil	July 1959
91. Harry's Brook	L. Sanford/A. Bent	June, July 1912
92. Spruce Brook	G. Noble	Aug. 1915
93. Port au Port, Romaines	A. Bent	Summer 1912
	G. Noble	June, Aug. 1915
94. Fox Island River	L. Sanford/A. Bent	June, July 1912
95. Lewis Hills	G. Noble	Aug. 1915
96. Shag Island	H. Peters/T. Burleigh	July 1944
97. Blow-Me-Down Mts.	E. Doane	1893-98
	A. Colburn/R. Potter	July, Aug. 1894

SYSTEMATIC ORNITHOLOGICAL STUDY, 1833–1900

TABLE 10. Continued

SITE	COLLECTOR	DATE
98. Bay of Islands	J. Cahoon	July, Aug. 1889
	W. Todd	July 1901
	A. Bent	June 1912
99. Trout River area	H. Peters/T. Burleigh	June 1944
100. Cowhead & vicinity	H. Reeks	Aug. 1866–Aug. 1868
101. Parsons Pond	J. Risling/F. Schueler	June 1972
102. Bellburne vicinity	J. Risling/F. Schueler/H. Garcia	May 1976
103. River of Ponds	W. Pepper	Summers 1919, 1920
104. St. John Island	H. Peters/T. Burleigh	July 1944
105. Hare Island	E. Doane	Aug. 1933
106. St. Genevieve Bay	H. Peters/T. Burleigh	July 1944
107. Flowers Cove	H. Peters/T. Burleigh	Aug. 1944
108. Pistolet Bay	H. Peters/T. Burleigh	June, July 1943
109. Cape Onion	H. Peters/T. Burleigh	June 1943

*Numbers refer to Fig. 17.

almost all of these holdings. The extensive collections made by Peters and Burleigh (1951b) during the 1940s are in the U.S. National Museum of Natural History, and since provincial confederation with Canada (1949), Newfoundland specimens have been housed at the National Museum of Canada (Ottawa) and the Royal Ontario Museum. More recently, the Newfoundland Museum in St. John's and the Department of Biology of Memorial University have been acquiring collections.

Clinton Hart Merriam, 1883.—Known for work on life-zones and the geographic distribution of species (Merriam, 1898; Peters and Burleigh, 1951b; Todd, 1963; Sterling, 1977), Merriam was a founding member of the American Ornithologists' Union and of the National Geographic Society. He was also instrumental in establishing, and was the first director of, the U.S. Bureau of Biological Survey, the forerunner of the Fish and Wildlife Service (Sterling, 1977). Both Todd (p. 128) and Oberholser (p. 128) worked at the Bureau for Merriam, who proved to be a difficult superior (Sterling, 1977).

As surgeon on the steamer *Proteus*, Merriam visited the Newfoundland seal hunt in March/April 1883 to collect for S. F. Baird, head of the Smithsonian Institution (Sterling, 1977). Other collections were made as well. In a fresh water marsh about a mile from St. John's he obtained the island's first Least Bittern (Merriam, 1883c). This bird is a rare vagrant today (Appendix I) and has been recorded only a half dozen times in the past 100 years. Merriam also made the first sight identifications of White-winged Scoter and Ring-billed Gull in Newfoundland (Merriam, 1883b).

On the basis of information collected from local inhabitants, including J. P. Howley, Merriam (1883a) published a short note indicating that Harlequin Ducks were common summer residents that nested in hollow stumps

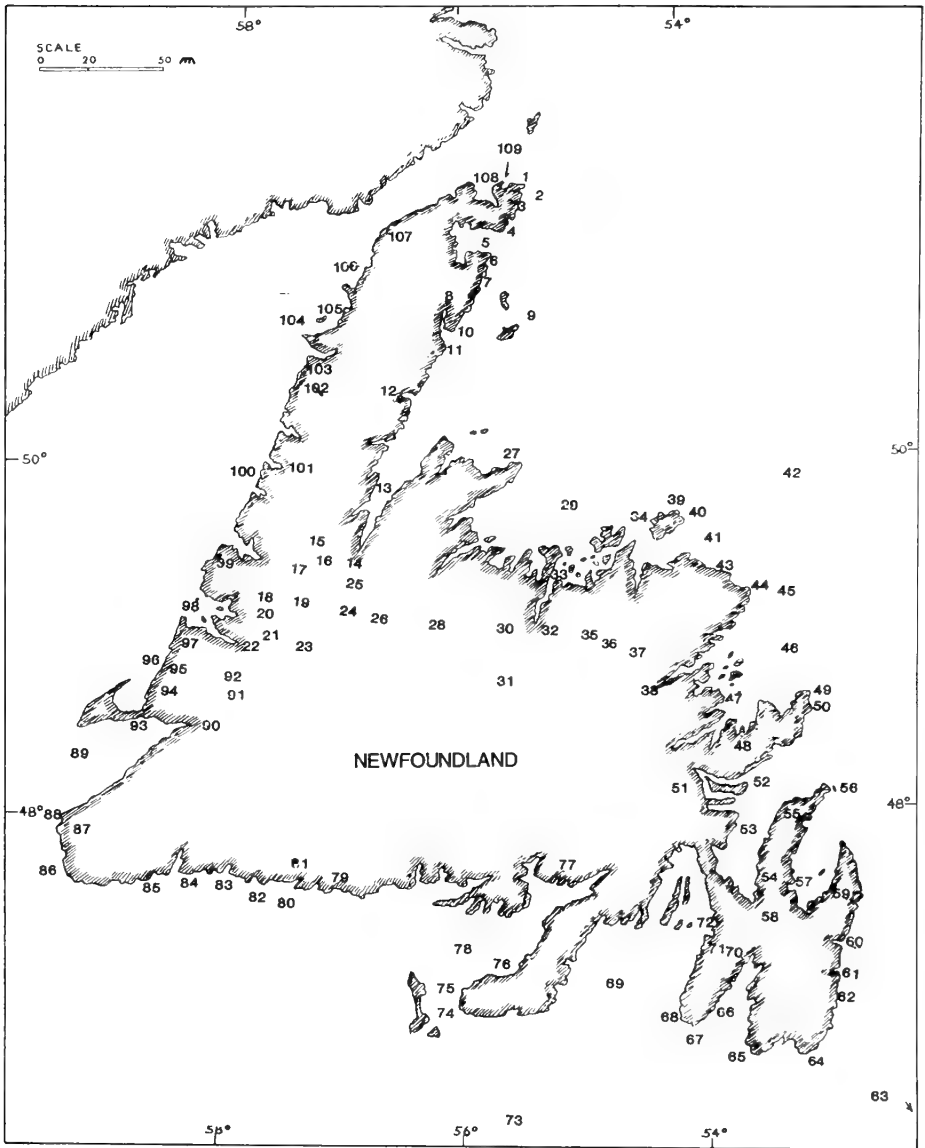


FIG. 17. Collecting sites on insular Newfoundland used by major bird collectors. See Table 10 (p. 107) for names of sites, ornithologists, and dates.

along interior waterways. Though fairly common in winter, Harlequin Ducks are very uncommon in summer. To date there is only one breeding record, although it is our impression that these ducks may nest along remote mountain rivers and streams (Montevocchi, et al., 1982). Perhaps the species bred more commonly in Newfoundland a century or more ago.

Newfoundland Willow Ptarmigan and Leonhard Hess Stejneger.—A Norwegian lawyer turned ornithologist, Stejneger wrote a small book (1873) on Norwegian avifauna before moving in 1881 to Washington, D.C., where he worked at the Smithsonian Institution (Anker, 1938). Stejneger's (1884) contribution to Newfoundland ornithology lies in his description of the island's subspecies (*alleni*) of Willow Ptarmigan. His efforts undoubtedly prompted Brewster (1885; see below) to take a closer look at Rock Ptarmigan and to publish his findings. Stejneger also suggested (1885) that apparent specimens of the Pacific subspecies of Common Eider (*Somateria mollissima v-nigra*) collected in the northwest Atlantic may have been hybrid crosses of Common and King Eiders.

Newfoundland Rock Ptarmigan and George O. Welch.—During the spring and summer of 1883, Welch came to Newfoundland from Lynn, Massachusetts, to collect specimens, at least some of which are now housed in the Museum of Comparative Zoology. He obtained Willow Ptarmigan and the first series of Rock Ptarmigan. Brewster (1885) designated the insular subspecies (*welchi*) in his honor. Welch also collected the first Parasitic Jaeger and the second Pomarine Jaeger specimens for the island. One of his labels on a Pomarine suggested that he worked off the south coast.

Frederic A. Lucas and William Palmer and the Grampus Expedition to Funk Island.—In 1887 the United States National Museum and the Fish and Wildlife Commission organized a cruise of the schooner *Grampus* to Newfoundland, Labrador, and the Gulf of St. Lawrence to collect fisheries data. The expedition included a stop at Funk Island, where Great Auk material was collected.

Lucas constructed two or three complete Great Auk skeletons from bones collected at Funk Island (Fig. 18). He and Palmer also documented the status of the island's breeding seabirds (Kirkham and Montevecchi, 1982; Chap. 9).

In July and August 1887 Palmer (1890) obtained the first Newfoundland specimens of Sanderling, and of White-rumped and Least Sandpipers. Besides Reeks (1869), he is the only other observer prior to 1985 to have claimed to have seen a Stilt Sandpiper in Newfoundland, recording one at Penguin Island, Bonavista Bay. Palmer was also the first (again after Reeks) to report the Common Grackle and has the first recorded Newfoundland sightings for the Water Pipit, American Redstart, American Tree Sparrow, and others. Palmer's observation of a young Thick-billed Murre near Canada Bay in July 1887, if reliable, would be the first record of the species in Newfoundland. Most early observers apparently did not distinguish between Thick-billed and Common Murres.

John Cyrus Cahoon, the Bird Island Man, 1889–1891.—As his letterhead indicates, Cahoon was a professional collector (Figs. 19, 20). From January through July 1887 he collected and prepared more than 1,200 specimens in Arizona and Mexico. His series of Rusty Sparrows and of Brown-throated



FIG. 18. Skeleton of a Great Auk assembled by F. A. Lucas from material collected on Funk Island during the Grampus Expedition of 1887. Specimen in Museum of Comparative Zoology, Harvard University (photo: WAM).

(House) Wrens were used by Brewster (1888) to describe new forms which were named in his honor (*cahooni*), forms that have been rejected by the American Ornithologists' Union (1957, but cf. Mayr and Greenway, 1960; Phillips, et al., 1964). Before working in the Southwest, Cahoon had previously made extensive collections in the southeastern United States and in his home state of Massachusetts.

Cahoon first came to Newfoundland in the spring of 1889 to collect for Charles F. Batchelder of Cambridge, Massachusetts. William Brewster (also of Cambridge), for whom Cahoon had worked previously, contracted him for a fall collecting trip on the Grand Banks. Cahoon worked in Newfoundland through November 1889 and returned early the next year, again under contract with Brewster. Staying through spring 1891 (see below), he spent most of his time on the Cape Shore of the Avalon Peninsula at Cuslett, Cape St. Mary's, Big Barasway, Placentia, and Point Lance, and he also collected at Exploits Bay and the Bay of Islands.

Cahoon can be credited with obtaining and preparing 92 first avian specimen records for Newfoundland, and he was the second collector to obtain specimens of 15 other species (Table 11). H. L. Bigelow, who accompanied Cahoon on many trips (p. 117), obtained four of the first specimens of the latter species only a few days or weeks before Cahoon did. About 1,200 of Cahoon's bird skins from Newfoundland found their way, via Brewster's and Batchelder's collections, into the Museum of Comparative Zoology.

Cahoon made many outstanding documentations. His Eskimo Curlew, Thayer's Gull, and Bridled Tern are the only specimens for Newfoundland. Peters and Burleigh (1951b) missed the Bridled Tern in their search of skins at the Museum of Comparative Zoology. L. M. Tuck located it in 1955 and thereby confirmed a new species occurrence for Newfoundland. While on the Grand Banks Cahoon shot the only known specimen of a dark phase Long-tailed Jaeger (R. Viet, pers. comm.). Batchelder (1908) used a specimen that Cahoon obtained in Placentia on 30 May 1890 to describe the Newfoundland subspecies *terranovae* of the Hairy Woodpecker, and Batchelder (1918) used two males that Cahoon collected as type material for the race of the Newfoundland Yellow Warbler (*Dendroica petechia amnicola*). Cahoon collected Western Kingbird, Indigo Bunting, and Lark Sparrow specimens; more than 60 years elapsed before the next Western Kingbird was sighted, and the next provincial record of Lark Sparrow, after Cahoon's, was not obtained until 1962. Cahoon collected a vagrant Northern Oriole on the Grand Banks on 21 September 1889; this species still occasionally shows up on ships in Newfoundland waters during autumn. At Cuslett Cahoon shot a drake Common Eider with a black v-mark on its throat that was considered by Peters and Burleigh (1951b) to belong to the Pacific subspecies *v-nigra*. This throat mark is no longer considered diagnostic of the Pacific race (Lysaght, 1971: 355; see, also, Chap. 5).

In *The Birds of Newfoundland*, Peters and Burleigh (1951b) claimed, interestingly, that Thick-billed Murres did not nest on the island. These alcids

currently nest widely in Newfoundland, though in much smaller numbers than the abundant Common Murre (Chap. 9). From Cahoon's specimen material, we also know that Thick-billed Murres nested in Newfoundland well before the turn of the 20th century. On 17 July 1890 Cahoon collected an adult female and a nestling (MCZ Nos. 186203-4) Thick-billed Murre at Cape St. Mary's. These specimens, that are housed at the Museum of Comparative Zoology, were apparently overlooked by Peters and Burleigh in their search through the material there.

Cahoon was an intense adventurer. He climbed the crumbly, 100 m high Bird Rock at Cape St. Mary's on 10 July 1889 (Fig. 35; p. 171). To this day some older residents of the cape shore still recall Cahoon's feat, which he wrote about in a letter to Brewster on 17 August 1889.

"While at Cape St. Mary's I climbed to the top of 'Bird Island' a nearly perpendicular rock (300 feet high). The fishermen say no one has ever before climbed to the top and that two men have been killed in the attempt. The Gannets and Murres nearly carried me off the island and I was obliged to fight my way with a club. I could not get down from the top and was obliged to be taken off to the cliffs on the mainland by means of a block and ropes. The fishermen look upon me as a wonderful man and they may and will do anything for me in the way of helping me to get birds."

According to local accounts of Cahoon's rescue, his grip weakened as he was making his way across the ravine between the stack and the mainland. He had to let go and dropped the length of slackened rope that was tied around him. Fortunately the boswain's chair in which he was secured held, and he was pulled to safety (Anonymous, 1889; Wynne-Edwards, 1935b). Cahoon was thereafter referred to as the "Bird Island Man" by local fishermen (Bigelow, 1890).

Less than two years later on 26 April 1891, in nearby Cuslett, Cahoon's grip again failed him while climbing on cliffs, but this time fate was against him. After being landed by two young boys in a dory at the base of a coastal cliff known as Shag Roost (Webster, 1891), Cahoon gained the top of the cliff by an indirect route. He then descended by rope from an overhang to a raven's nest on the cliffs, where he collected four eggs. On reaching the overhang on his ascent, the rope was pulled taut against the rock by his body weight. Neither hand- nor foothold could be secured and his strength waned, while two young boys watched helplessly from their dory below. After about 20 minutes of hard struggle, his grip loosened and he began sliding down the rope. Failing in his weakened attempt to swing himself into the nest ledge, he continued to slide ever more rapidly down the rope while trying futilely to brake with his arms and legs. At the end of the rope he struck the cliff face and fell backward 70 feet to the rocks below and rolled into the sea, where his body was recovered the next day (Webster, 1891).



FIG. 19. Sketch of J. C. Cahoon that appeared in the issue of *Ornithologist and Oologist* which contained his obituary (1891, vol. 16(5):73–75).

Cahoon's important contributions to ornithology have remained relatively unknown. His death at 27 years of age, and his contractual work for others, prevented him from writing about his Newfoundland findings, though as his many informative articles in *Ornithologist and Oologist* (e.g., Cahoon, 1888) indicate, he was quite capable of doing so. This anonymity should exist no longer.

Homer L. Bigelow.—In 1890 Bigelow travelled from Boston to Newfoundland, where he met up with Cahoon and spent five months, from June to November, collecting with him. His account of the trip is interesting and provides insight into Cahoon's persevering and hard-working nature (Bigelow, 1890).

Eight first and 35 second Newfoundland specimen records can be attributed to Bigelow, and approximately 150 of his Newfoundland skins are now housed at the Museum of Comparative Zoology. He and Cahoon visited Cape St. Mary's on many occasions and noted the large number of gannets, kit-



Taunton, Mass., U. S. A.



1886

17/4
Mr William Brewster,
Dear Sir,

I have a fine specimen of Florida
burrowing owl and an Oystercatcher
in the skin. I will sell the owl to
you for 3.50 and the oystercatcher for
1.50. These birds were collected by
myself and are labeled with the ti-
tulating and sex. I also have a
Florida burrowing owl mounted in first
class manner that I will sell for
5.00.

Respectfully yours
John C. Cahoon

FIG. 20. J. C. Cahoon's professional letterhead.

TABLE 11. Species for which J. C. Cahoon obtained specimen records on insular Newfoundland from 1889-91.

FIRST SPECIMEN RECORDS	
Sooty Shearwater	Yellow-bellied Flycatcher
Wilson's Storm-Petrel	Western Kingbird
Northern Gannet	Horned Lark
Double-crested Cormorant	Tree Swallow
Green-winged Teal	Barn Swallow
American Black Duck	Gray Jay
Lesser Scaup	American Crow

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TABLE 11. Continued

FIRST SPECIMEN RECORDS	
King Eider	Common Raven
Oldsquaw	Black-capped Chickadee
Black Scoter	Boreal Chickadee
Common Goldeneye	Brown Creeper
Sharp-shinned Hawk	Winter Wren
Northern Goshawk	Gray-cheeked Thrush
Merlin	Hermit Thrush
Semipalmated Plover	American Robin
Spotted Sandpiper	Water Pipit
Eskimo Curlew	Yellow Warbler
Whimbrel	Magolia Warbler
Least Sandpiper	Yellow-rumped Warbler
Pectoral Sandpiper	Black-throated Green Warbler
Purple Sandpiper	Blackpoll Warbler
Common Snipe	Black-and-white Warbler
Red-necked Phalarope	American Redstart
Red Phalarope	Ovenbird
Long-tailed Jaeger	Northern Waterthrush
Great Skua	Mourning Warbler
Thayer's Gull	Common Yellowthroat
Black-legged Kittiwake	Wilson's Warbler
Common Tern	Indigo Bunting
Arctic Tern	American Tree Sparrow
Bridled Tern	Lark Sparrow
Dovekie	Savannah Sparrow
Common Murre	Fox Sparrow
Thick-billed Murre	Song Sparrow
Razorbill	Lincoln's Sparrow
Mourning Dove	Swamp Sparrow
Great Horned Owl	White-throated Sparrow
Snowy Owl	Dark-eyed Junco
Short-eared Owl	Snow Bunting
Belted Kingfisher	Northern Oriole
Yellow-bellied Sapsucker	Pine Grosbeak
Downy Woodpecker	Purple Finch
Hairy Woodpecker	Red Crossbill
Black-backed Woodpecker	Common Redpoll
Northern Flicker	Pine Siskin
Olive-sided Flycatcher	American Goldfinch
SECOND SPECIMEN RECORDS	
Northern Fulmar	Parasitic Jaeger
Greater Shearwater	Ring-billed Gull
Common Eider	Glaucous Gull
Osprey	Herring Gull
Lesser Golden Plover	Great Black-backed Gull
Greater Yellowlegs	Black Guillemot
Rock Ptarmigan	Swainson's Thrush
Pomarine Jaeger	

tiwakes, murrees, and Razorbills nesting there (p. 171; Montevocchi and Wells, 1984b).

Hermit Taxidermist of Labrador, Ernest B. Doane.—Born in Yarmouth, Nova Scotia in 1866, Doane learned taxidermy as a teenager. In the late 1880s he moved to the west coast of Newfoundland, where he resided intermittently for about a decade. Like Cahoon, he enjoyed adventure, such as canoeing from Labrador across the Strait of Belle Isle to Newfoundland to deliver the mail in mid-winter. Unlike Cahoon, Doane lived to a mature age of 79 years. His solitary life, work, and reputation earned him the local title “Hermit Taxidermist of Labrador” (L. M. Tuck, 1978). Many publications by professional ornithologists have made extensive use of Doane’s material (e.g., Bailey, 1939; Todd, 1963). Most of Doane’s birds were collected in southern Labrador, though his collections in western Newfoundland, which focused on mammals, contained many notable birds as well. Most of his early mammalian specimens were collected for Outram Bangs (1913) of the Museum of Comparative Zoology, who produced the first definitive publication on Newfoundland land mammals.

From 1893 through 1898 at Codroy, Bay St. George, and in the Blow-me-down Mountains, Doane secured six first Newfoundland specimen records, as well as many second and subsequent documentations (Table 9). Howe (1900a) relied primarily on a series of Veeries collected by Doane in the Codroy Valley to describe the race *fuliginosa*. A female Solitary Sandpiper was collected on 5 August 1896 at Bay St. George, the only Newfoundland specimen to date of this very uncommon species. Doane obtained the first White-winged Crossbill and the first five Boreal Owl specimens, and five Northern Hawk-Owls in Codroy and Bay St. George.

Doane moved to Labrador in 1898 and worked in the L’Anse-au-Loup–West St. Modeste–Red Bay area, collecting for Bangs (e.g., 1900) and others until shortly before his death in 1937. His later specimens were purchased primarily by Joselyn Van Tyne and Lee R. Dice of the Museum of Zoology at the University of Michigan and also by W. E. Clyde Todd (p. 128) of the Carnegie Museum, John D. Smith of the Boston Society of Natural History, H. B. Conover of Chicago, Harold H. Bailey of the Florida Society of Natural History (Coral Gables), and by The Academy of Natural Sciences of Philadelphia (L. M. Tuck, 1978). He may have also collected for some British institutions.

Two Savannah Sparrows taken on 17 May 1899 and on 4 May 1900 at L’Anse-au-Loup provided the type material for the subspecies *labradorius* (Howe, 1901, 1902, 1903). A Great Horned Owl obtained at L’Anse-au-Loup in 1899 was described by H. C. Oberholser (1914; p. 128) and is the type specimen of the Newfoundland and Labrador race *heterocnemis*. An immature male Little Blue Heron taken at L’Anse-au-Loup was the subject of an occurrence note by Bangs (1900). Doane’s most famous specimen is an Eskimo Curlew from Battle Harbour, Labrador, taken on 29 August 1932,

which is the last specimen of this species collected (Fig. 21; Van Tyne, 1948).

On 15 February 1935 Doane collected a female Great Grey Owl at West St. Modeste, the only provincial record to date. On 8 December 1930 he took a Long-eared Owl at Red Bay, still the most easterly record of the species (L. M. Tuck, 1978). Doane also had Labrador specimen records for the Turkey Vulture, a Northern Goshawk that has been provisionally identified by Van Tyne and E. Mayr as an intermediate between the North American subspecies *atricapillus* and the European nominate race *gentilis* (Todd, 1963), a Sora, five Northern Lapwings during the well-documented "invasion" of 1927 (Brewster, 1906; Peters and Burleigh, 1951b), a European Whimbrel, at least ten Ivory Gulls, a Barn Swallow, and a Brown-headed Cowbird (Bailey, 1939; Todd, 1963; L. M. Tuck, 1978). Doane also requested an export permit for a Bonaparte's Gull taken in June 1935, though the whereabouts of this specimen is not known (L. M. Tuck, 1978). If located it will be a first specimen record for Labrador (Todd, 1963).

Doane collected more than 100 species in Labrador (L. M. Tuck, 1978). His natural history collections and observations were recorded in diaries which



FIG. 21. Eskimo Curlew, based on a specimen collected by E. Doane in Battle Harbour, Labrador and now housed at the Museum of Comparative Zoology (drawn by J. Zickefoose).

Dr. Wilfred Grenfell urged Doane to publish. A Mrs. Glenhorn(?) had apparently promised to pay Doane for copying excerpts but never made good on the offer. The event may have been instrumental in Doane's decision late in life to burn his diaries (L. M. Tuck, 1978), thus creating an irrevocable loss for the history of North American ornithology.

A. E. Colburn.—Probably working for Batchelder, Colburn collected extensively in western Newfoundland around Deer Lake, the Humber River, Bay of Islands, Adies Pond, and Blow-me-down Mountains from February through July 1894. More of his birds from insular Newfoundland are housed in the Museum of Comparative Zoology than the combined totals of those obtained by Bigelow and Doane (Table 9). The breadth of Colburn's Newfoundland material is perhaps best reflected in his many secondary and tertiary records (Table 9).

R. B. Potter who also has many specimens in the Museum of Comparative Zoology (see below) collected with Colburn from May through July 1894, and many of their specimens are jointly labelled. We have located seven first specimen records from Newfoundland that were obtained by Colburn; two (Palm Warbler, Purple Finch) are credited to both Colburn and Potter on specimen labels. Batchelder (1918) used a male and a female Ovenbird that Colburn collected at Deer Lake as the cotypes for the Newfoundland race *furvior*. Colburn also took 23 Yellow-bellied Sapsuckers around Deer Lake; these birds are very localized breeders in Newfoundland.

R. B. Potter.—We can credit Potter with two first specimen records (jointly with Colburn) and many other documentations, almost all of which were jointly credited to Colburn (Table 9). From dates on bird skins at the Museum of Comparative Zoology it appears that Potter began collecting in Newfoundland a little later than, and stopped somewhat before, Colburn.

James Patrick Howley, Curator of the Newfoundland Museum.—We have already encountered Howley's formidable research in our consideration of the Beothuks (p. 40). A geologist by profession and director of the Geological Survey of Newfoundland, he had a rich grasp and appreciation of natural history (Callaghan, 1980). In 1876 he produced a small school book, entitled *Geography of Newfoundland*, that listed the island's trees, fishes, mammals, and birds, the latter being derived from Reeks (see p. 91). In 1887 he made a geological survey across central Newfoundland from Fortune Bay to Bonavista Bay, via the Bay du Nord and Terra Nova Rivers. He reported that Koskaecoddee Lake, which feeds the Bay du Nord River, derived its name from the Micmac word for the Royal Tern and that these birds nested on a sandy spit that projected from an island in the middle of the lake. The terns to which Howley (1888) referred were most probably Caspian Terns, which nest in scattered locations in Newfoundland today.

Howley was curator of the Newfoundland Museum from its inception in 1887 to 1918. In this position he often emphasized the need for ornithological study in Newfoundland (Howley, 1913). He published a paper on

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Canada Geese in Newfoundland (Howley, 1884), and the island's first specimens of Northern Lapwing and Turkey Vulture were presented to Howley by local hunters in the fall of 1905 (see, Brewster, 1906, for details).

Jewell David Sornborger.—Sornborger, from Cambridge, Massachusetts, visited Funk Island. In a letter of 15 December 1902 to Alexander Agassiz he claimed to have collected more than 10,000 Great Auk bones, representing more than 1,000 individuals. Owen Bryant, who visited Newfoundland in 1906 (p. 126) wrote to Samuel Henshaw of the U.S. National Museum and suggested that Sornborger may have bought his bones from a Fogo Island fisherman. Like Sornborger, Bryant was interested in selling Great Auk material, and rivalry may have prompted this contention.

From 1892 to 1897 Sornborger made three collecting trips to Labrador. Though never publishing anything about this material, he probably accumulated a Labrador bird collection that was lost to science after his death (Austin, 1932). A few Labrador skins that Sornborger obtained from Reverend Walter W. Perret and from other Moravians are now in the Museum of Comparative Zoology (Austin, 1932; see, also, Howe, 1903; p. 125); some of these were formerly held by the Boston Society of Natural History.

Outram Bangs, Biogeographer.—A well-known mammalogist and ornithologist, Bangs was a stalwart at the Museum of Comparative Zoology from the turn of the century until 1932. He was in a unique position to promote specimen collecting. Following up on the private efforts of Batchelder and Brewster, he focused much of his “official” attention on Newfoundland and Labrador (p. 120). His influence was pervasive, as his many definitive zoological publications attest.

SYSTEMATIC ORNITHOLOGY DURING THE LATE NINETEENTH CENTURY

The development of the means for the permanent preservation of specimens was a benchmark technical advance for scientific ornithology (Farber, 1977). Once collectors were freed from the necessity of on-the-spot illustration, the rate at which data on morphological variation accrued increased logarithmically. Many wealthy, private collectors amassed large collections, most of which eventually were deposited in institutions. Moreover, the permanent storage of specimens satisfied much of the healthy scientific skepticism that had inevitably arisen when variation had to be assessed on the basis of descriptions of specimens that no longer existed. Specimens, especially type specimens, provided absolute standards with which to gage intra- and interspecific variation. These practices and concepts held immense value for the standardization of ornithological study. As shall be seen in the next chapter, specimen collecting did not to reach its heyday for some decades to come.

NEWFOUNDLAND ORNITHOLOGY IN THE TWENTIETH CENTURY

At the century's inception, Macoun (1900, 1903, 1904) produced a 700-page catalogue of Canadian birds. These volumes met with great public demand, and a revised edition was published in 1909. Although not a part of Canada at the time, Newfoundland received some coverage in the catalogues. This information is clouded, however, because Macoun relied solely on Reeks' (1869) account (see p. 91). Macoun's works set the stage for comprehensive reports on regional avifaunas, which up until this time were rare, as evidenced by Macoun's short list of original sources. The early 20th century witnessed a proliferation of such publications, and Newfoundland was not neglected, as the present chapter will show.

LOUIS HOPKINS PORTER

Porter (1900), a New York City lawyer, produced a 50 species account, based on a six-week (10 August–24 September 1899) hunting and fishing trip on the Humber River. Of note, he claimed to have shot a Lesser Scaup and to have seen a Ruddy Duck, the latter being the first Newfoundland record. Some identification problems may have arisen with raptors. The Red-tailed Hawk was considered rather uncommon. This *Buteo* was, however, listed hypothetically by Peters and Burleigh (1951b), and the island's first accepted sight record was not made until 1967 by J. E. Maunder. It is possible that the species was more common in western Newfoundland around the turn of the century; it is common in southern Labrador today (J. Pratt, pers. comm.). Porter also reported a Great Gray Owl, a species that has been conclusively documented in Labrador but not in Newfoundland. Two other birds that are also not on the latest provincial checklist, and that may have been misidentified, are White-eyed Vireo and White-breasted Nuthatch.

REGINALD HEBER HOWE, JR.'S NEWFOUNDLAND VEERY AND LABRADOR SAVANNAH SPARROW

As tangible outcomes of the increased collecting efforts made around the turn of the century, Howe (1900a, 1900b, 1901, 1902, 1903) proposed two local races, the Newfoundland Veery (*fuliginosa*) and the Labrador Savannah Sparrow (*labradorius*); both are still recognized. The specimens that Howe used as his subspecific types were collected by Doane and are now housed at the Museum of Comparative Zoology. Noble (1919) argued against the subspecific differentiation of the Newfoundland Veery from the mainland forms, but Peters and Burleigh (1951b) and the American Ornithologists' Union (1957) upheld Howe's classification.

From 7 to 14 July 1911, Howe studied botany and kept bird records at

Stephenville Crossing. To supplement Arnold's (1912) account of birds in western Newfoundland (see p. 127), Howe (1913) published a note about his sightings and those of Dr. George Shattuck that had been made on the Humber River from 13 September to 4 October 1912. Included are the first Newfoundland records of a Great Blue Heron, which had been seen by Shattuck, and a pair of Piping Plovers, observed by Howe on the beach at Stephenville Crossing. These plovers are rare breeders in Newfoundland today (Appendix I) and nest in the vicinity of Stephenville Crossing.

FIRST COMPREHENSIVE MONOGRAPH ON THE LABRADOR AVIFAUNA BY CHARLES WENDELL TOWNSEND AND GLOVER MORRILL ALLEN, 1907

This early monograph (1907) on Labrador birds was published 30 years before Ewing's account of Newfoundland's avifauna (see p. 133) and almost 50 years before Peters and Burleighs' book (see p. 137). This sequence of events shows how individual efforts shape written history. Ironically, at the time of Townsend and Allen's publication (1907), more work had been carried out in Newfoundland than in Labrador, though no doubt the cumulative influences of Banks, Cartwright, and Audubon stimulated more interest in Labrador.

Townsend, a physician from Ipswich, Massachusetts, had a keen interest in the birds of Labrador and spent much time there (Townsend, 1907). In 1911 he edited and published an abridged version of Cartwright's Labrador diaries, and he also wrote extensively on Audubon's work in Quebec-Labrador (Townsend, 1917, 1918, 1919).

Townsend and Allen's monograph is the first serious attempt at a full coverage of Labrador's avifauna, overshadowing Stearn's (1883, 1890), Turner's (1885), and Packard's (1891) earlier, but highly criticized works (Merriam, 1884; Allen, 1885; Todd, 1963). A literature review, searches of museum collections, and a brief (10 July to 2 August 1906) coastal trip that reached Nain, form the basis of the work. Fifty-eight skins were collected and another 20 obtained from Eskimos along the way. Brief accounts of 213 species and subspecies "considered certain," another 44 of doubtful occurrence, and two species that were extinct (Labrador Duck, Great Auk) were presented. Townsend (1909, 1913; Townsend and Bent, 1910) supplemented the original material with reports of birds encountered on trips to the Quebec North Shore, then referred to as Labrador.

Townsend (1916) also proposed a Labrador subspecies, *nigricans*, of the Boreal Chickadee, a proposal that was rejected by the American Ornithologists' Union. At St. Anthony in the spring of 1905, Townsend collected the first Newfoundland specimen of Peregrine Falcon and the fifth of a Great Horned Owl.

OWEN BRYANT

Bryant, a doctor from Cohasset, Massachusetts, visited Newfoundland in 1905 and 1906 and stayed for a time with Dr. Wilfred T. Grenfell at St.

NEWFOUNDLAND ORNITHOLOGY IN THE TWENTIETH CENTURY

Anthony. In the summer of 1908 he and his brothers, John and Edward, and others chartered Grenfell's schooner, the *Lorna Doone* (Johnson, 1926), and Bryant collected bryozoa, polychaetes, and mollusks along the coasts of Labrador, Newfoundland, and Nova Scotia (Moore, 1910; Kendall, 1911). He also collected birds on the Northern Peninsula, Fogo Island, in Conception Bay, and elsewhere. On Funk Island he obtained a large quantity of Great Auk material (p. 123). On 20 April 1906, at Southwest River, Bryant obtained the second Newfoundland specimen of a Northern Shrike, 140 years after Banks collected the first.

EDWARD ARNOLD AND W. J. BROWN'S COLLECTIONS FROM WESTERN NEWFOUNDLAND

Arnold was an amateur egg collector who travelled widely across North America. His egg collection was extensive, with more than 1,000 species and subspecies represented (Houston and Bechard, 1982). In 1911 and 1912 Arnold and W. J. Brown, an egg collector from Montreal, visited western Newfoundland travelling from Port aux Basques, like most wilderness tourists of the time, on the Reid–Newfoundland Railway. Both men published separate, almost identical, papers on records from their first trip, Brown (1911) in the *Ottawa Naturalist* and Arnold (1912) in the *Auk*.

Some interesting, as well as problematic, listings occur. "Six or seven" pairs of Glaucous Gulls were reported nesting on a lake a few miles inland from Bay St. George (Brown, 1912). Other circumstantial reports of these birds breeding in western Newfoundland were made at about this same time (Bent, 1921; Peters and Burleigh, 1951b). Today this species' known breeding range extends only as far south as 55°N lat. in Labrador (Lock, 1979). The early nesting reports suggest a substantial retraction in breeding range during recent times.

Brown and Arnold published the first reports of the Common Merganser, Eastern Kingbird (Reeks reported an earlier nesting record that may have been in error; see p. 91), and of the Least and Alder Flycatchers (in 1912 they found a nest of the latter species with three fresh eggs). Noble (1919) questioned the flycatcher listings in view of the absence of the common Yellow-bellied Flycatcher, and Griscom (1926) challenged the kingbird entry in view of the absence of the Olive-sided Flycatcher. Their Bay-breasted Warbler and Chipping Sparrow observations are noteworthy, even though these species were also listed by Reeks (Table 8). Two Chestnut-sided Warblers and a Canada Warbler were also reported; the latter was stated to be "fairly common in spruce woods." Peters and Burleigh (1951b) considered both hypothetical; both are rare today (Maunder, et al., 1986).

Motivated by oological interests, Brown and Arnold compiled a very impressive set of first nest records for Newfoundland that included American Black Duck, Common Goldeneye, Common Merganser, Greater Yellowlegs, Least Sandpiper, Merlin, Osprey, Belted Kingfisher, Hermit and Swainson's

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Thrushes, Ruby-crowned Kinglet, Rusty Blackbird, Water Pipit, Yellow Warbler, Black-throated Green Warbler (the only one to date), Northern Waterthrush, Lincoln's, Song, Swamp and Fox Sparrows, Dark-eyed Junco, and Pine Grosbeak. Arnold (1912) also reported finding a Rock Ptarmigan nest, which on the basis of habitat (spruce bog), we, like Noble (1919), consider instead to be the first nest record for the Willow Ptarmigan.

ARTHUR CLEVELAND BENT

Arthur Cleveland Bent is well known to ornithologists for his monumental, multi-volumed work on the life histories of North American birds, which was published over the first half of the 20th century. Bent visited Newfoundland and Labrador, and had the first accepted Newfoundland sight records for Common Moorhen, Eastern Kingbird, Bank Swallow, and Tennessee Warbler, and the first nest record for Common Loon. In 1912 Bent described an insular race (*percna*) of the Red Crossbill. This race was recognized by Griscom (1937) and has stood the test of time, although an older type specimen, designated *pusilla* by Gloger, was discovered and Bent's subspecific name has been replaced by Gloger's (Godfrey, 1959). F. S. Hersey collected for Bent in Newfoundland in 1913, as did J. R. Whittaker in 1913, 1917, 1918, 1923, and 1925. Whittaker observed a brood of Black Scoters on Grand Lake, the only provincial nesting record for this species to date.

WALTER EDMOND CLYDE TODD'S COMMITMENT TO LABRADOR

Todd wrote the *Birds of Western Pennsylvania* (1940) and was Curator of Birds at the Carnegie Museum. His association with that museum began in 1901, and he is responsible for the extensive collection of Labrador and Newfoundland birds there. Beginning in 1901, he organized and/or made 25 trips to the Labrador Peninsula over a 58-year period, during which 5,375 specimens were collected (Todd, 1963). The fruit of these labors, *Birds of the Labrador Peninsula and Adjacent Areas* (1963), a meticulously detailed work, is still the definitive regional study. It contains extensive annotations for 338 species and subspecies.

While travelling to and from Labrador, Todd visited western Newfoundland on many occasions from 1901 through 1955. His collecting trips on the island yielded the first specimen records of Ruby-crowned Kinglet and Tennessee Warbler, and the second sight documentations for Solitary Sandpiper and Song Sparrow. Also to his credit are the island's third specimen records for Red-breasted Merganser and Olive-sided Flycatcher, fourths for Great Horned Owl, Belted Kingfisher, and Black-backed Woodpecker, and the fifth specimen of a Downy Woodpecker.

HARRY CHURCH OBERHOLSER, NORTH AMERICAN BIRD AUTHORITY

Oberholser is perhaps best known for a posthumously completed two-volume compendium on the avifauna of Texas (1974), that is handsomely il-

illustrated by Louis Agassiz Fuertes. Working at the U.S. Museum of Natural History, he was a recognized authority on North American bird identifications. Macoun (1904) acknowledged his debt to Oberholser for keying-out difficult warbler and sparrow skins, and Townsend and Allen (1907), as well as Aldrich and Nutt (1939), also turned to Oberholser for criticism and opinion.

From 16 to 26 September 1928 Oberholser visited the Newfoundland Museum, where he identified many specimens. These determinations became extremely valuable after 1934 when the newly established Commission of Government disbanded the museum, which was seen by the government as an unnecessary luxury during economic depression. Most specimens were discarded and many others inadequately housed (Callaghan, 1980). First Newfoundland specimens that Oberholser identified include Ruddy Duck, King Rail, Great Egret, Yellow-crowned Night-Heron, and Bonaparte's Gull (Peters and Burleigh, 1951b). Through the initiative of Gower Rabbitts, unusual bird specimens that were obtained by the Newfoundland Department of Natural Resources (an organization that encouraged their collection) from 1928 to 1940 were shipped to Oberholser in Washington. Following identification the specimens were returned to Newfoundland (Peters and Burleigh, 1949, 1951b).

Working with skins collected by Dr. L. C. Sanford (some of whose material was also used by Bent) in western Newfoundland, Oberholser (1914) described the Newfoundland subspecies of Gray Jay (*sanfordi*) and Pine Grosbeak (*eschatosus*). In the same paper he also proposed insular races of Downy Woodpecker and Great Horned Owl, both of which Noble (1919) contended did not differ reliably from the mainland subspecies. Noble's judgement was the one upheld by Peters and Burleigh (1951b), Godfrey (1959), and by the final court of appeal, the American Ornithologists' Union (1957; see, also, Taverner, 1942). Oberholser's (1948) proposed insular race of the Common Yellowthroat has also been rejected by subsequent investigators (Peters and Burleigh, 1951b; Godfrey, 1959).

ORNITHOLOGY IN NEWFOUNDLAND SPARKED BY GOWER RABBITTS

As Clerk of Newfoundland's Game and Inland Fisheries Board, and founder of the Newfoundland and Labrador Natural History Society, Rabbitts stimulated ornithological interest in Newfoundland. He promoted the collection of unusual species, which were shipped to Oberholser for identification. Rabbitts identified the first Newfoundland specimen of a Pied-billed Grebe, which was shot on 26 November 1930 at Parson's Siding (Peters and Burleigh, unpubl. field notes). He also encouraged others (e.g., Wynne-Edwards, 1935b; Aldrich and Nutt, 1939) to study Newfoundland birds. In 1937 Rabbitts and Harry Walters met Harold Peters and stressed the need for a thorough study of the avifauna of Newfoundland. A cooperative agreement was struck between the Newfoundland Department of Natural Re-

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sources and the U.S. Fish and Wildlife Service for the avifaunal investigation that resulted in Peters and Burleigh's *The Birds of Newfoundland* (1951b). Burleigh and Peters (1948) proposed an insular subspecies of the Boreal Chickadee that they named *rabbittsi* to acknowledge their gratitude to Rabbits. Their acknowledgement was tarnished, however, when on the basis of subsequent investigation the race was rejected (Godfrey, 1951, 1959; American Ornithologists' Union, 1957).

GLADWYN KINGSLEY NOBLE

During the summer of 1915 Noble (1919) collected birds in Newfoundland for the Museum of Comparative Zoology, and also collected some for the Newfoundland Museum. He reported that several species were darker than mainland conspecifics and considered them to represent incipient subspecies. The darker plumage of the insular birds was attributed to the humid conditions of the local habitat. The absence of many species found in Labrador also suggested barriers between the insular and mainland populations. Noble noted the habitat segregation of Willow and Rock Ptarmigan in the Lewis Hills, where the latter occurred on the bare syenite ridges at high altitude and the former on the lower vegetated slopes.

Specimens of 61 species were collected in the Deer Lake/Nicholsville area and in the Lewis and Hobley Hills. Among these were first Newfoundland specimens of Rusty Blackbird and White-crowned Sparrow, and the second for the White-winged Crossbill.

WILLIAM PEPPER BANDS FIRST BIRDS IN NEWFOUNDLAND

In 1919 and 1920 at River of Ponds, Pepper, a physician from Pennsylvania, banded the first birds in Newfoundland (six Gray Jays, two Swainson's Thrushes, two Blackpoll Warblers, and four Northern Waterthrushes). The next Newfoundland banding efforts were made in 1926, when Mrs. V. Campbell of St. George's banded a single Canada Goose and in 1944 when Harold Peters banded some gulls and terns (Pepper, 1945). From 1947 to 1951 more than 2,600 waterfowl were banded in the Codroy Valley by the Newfoundland Wildlife Service. More recent banding efforts in the Codroy Valley have been carried out by the Canadian Wildlife Service. The banding of landbirds, primarily under the direction of G. Bennett of Memorial University, and of seabirds (e.g., L. M Tuck, 1961; Threlfall, 1978) has received attention in recent decades.

LUNDLOW GRISCOM; BINOCULARS REPLACE SHOTGUNS

Affiliated with the Museum of Comparative Zoology and the Peabody Museum of Salem, Massachusetts, Griscom was an early and influential conservationist, especially in his home state where he coauthored a book on the avifauna of Massachusetts (Griscom and Snyder, 1955). Griscom also studied

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subspecific variation in Pine Grosbeaks (1934) and in Red Crossbills (1937); both are prominent finches of the boreal forest in Newfoundland.

Griscom was, most importantly, a pioneer in the “scientific” art of critical field observation and was largely responsible for the massive shift in ornithological documentation from specimen collection to rigorous observation in nature. His publications were the precursors of modern field guides and often dealt at length with methods of field identification that emphasized the diagnostic marks of living birds (e.g., Griscom, 1922, 1923; see, also, Chapman, 1895). Leslie Tuck and Roger Tory Peterson studied with Griscom at formative points in their careers, and he had a lasting influence on their later work. Peterson (1980: 11) considered Griscom, “The man to whom we all owed our inspiration and expertise . . . the court of last resort in matters of field identification.”

Four brief summer visits to western Newfoundland and Labrador in 1920–22 and 1925 laid the groundwork for a publication (Griscom, 1926). At the outset of the paper Griscom dismissed Reeks’ publication (1869; see p. 91) as “preposterous.” Like Noble (1919), Griscom noted that the Veery was restricted to limestone regions in southwestern Newfoundland. Impressed with the differences between the vegetation in calcareous and acidic soil regions, Griscom contended that some species, such as the Mourning Warbler and Common Redpoll, were dependent on habitat linked to the former. Griscom’s observation of the Chipping Sparrow was preceded only by those of Reeks (p. 91) and of Brown and Arnold (p. 127). He recorded the Song Sparrow as common around St. George’s and considered the Fox Sparrow and the Blackpoll Warbler to be the island’s most common landbirds.

All told, Griscom (1926) gave annotated accounts for 87 species, not including the first Cory’s Shearwater reported in Newfoundland (Griscom and Janvrin, 1922). Peters and Burleigh (1951b) listed this sighting as hypothetical but accepted Griscom’s observation of a Green-backed Heron at Port au Port on 22 July 1920, another first Newfoundland record. Curiously, Griscom (1926) did not mention either the Cory’s Shearwater or Green-backed Heron in his paper, suggesting that he might have reconsidered his earlier reports.

OLIVER LUTHER AUSTIN, JR.’S *BIRDS OF NEWFOUNDLAND LABRADOR* (1932)

Austin’s book (1932) is based exclusively on three summer surveys (1926–28) of the birds of coastal Labrador. Newfoundland Labrador excludes the Quebec North Shore that was visited by many earlier ornithologists (e.g., Audubon and Townsend). Accounts of 122 species and subspecies are presented. The Reverend Walter W. Perret, who had provided many ornithologists (e.g., Sornborger, Hantzsch, and Bent) with his records and specimens, donated his field notes for use in the book, a gesture that drew much gratitude from Austin.

VERO C. WYNNE-EDWARDS, MARINE ORNITHOLOGIST

Most biologists have encountered Wynne-Edward's (1962) views on the self-regulation of animal populations by altruistic mechanisms of individual reproductive restraint (group selection). This theory has received much attention and widespread rejection (e.g., Lack, 1966).

Wynne-Edwards (1935a) was a pioneer in marine ornithology, being one of the first scientists to systematically observe birds at sea and to correlate their distributions with oceanic features. Between May and September 1933 he made eight consecutive trans-Atlantic crossings over the same course between England and Montreal. Half of the "transects" crossed the Grand Banks and passed along the full length of Newfoundland's south coast from Cape Race to Cape Ray; the others passed north of the island and through the Strait of Belle Isle. His classification of inshore, offshore, and pelagic seabird communities is still very useful today.

Wynne-Edwards made the first systematic estimate of the number of gannets at Cape St. Mary's (see p. 174). He also made the first Newfoundland sight record of Manx Shearwater, the second of Iceland Gull, and third of both the Red Phalarope and Great Skua. In 1957 Wynne-Edwards published a note on bird observations at Goose Bay that included Common Nighthawk, Tree Swallow, Hermit Thrush, and Palm Warbler.

K. B. ROOKE AND THE ENGLISH PUBLIC SCHOOLS' EXPLORING SOCIETY BIRD TRIP

From 9 August to 12 September 1934 the Exploring Society of the British Public Schools visited interior Newfoundland south of Grand Falls. Rooke (1935a, 1935b), from Clifton, England, was the expedition's ornithologist and prepared careful reports of the birds observed on the island and on both trans-Atlantic crossings. Thirty specimens were deposited in the British Museum. The Society made other expeditions to Newfoundland in 1935, 1937-39, and 1947-48 (Peters and Burleigh, 1951b; see, also, p. 174).

Rooke's bird report (1935c) was the first substantive one from central Newfoundland (see, also, p. 71). Rooke conjectured that there were few birds relative to what the environment would support; insect abundance led to an expectation of more insectivorous birds. He speculated that Newfoundland was east of major North American migration routes and therefore missed that potential for the immigration of new breeders, and that severe winters kept the abundance and diversity of permanent residents low.

Rooke, like Reeks (1969) before him and Loomis (1945) after him, reported sighting a kestrel. Peters and Burleigh (1951b), however, considered the observation hypothetical. Mentioned, but not counted, in Rooke's tabulation of 63 species is a Solitary Sandpiper sighting that he was "fairly sure" of but did not count because neither Griscom (1926) nor Chapman (1934) had recorded it for Newfoundland. Had Rooke known that both Doane (p. 120) and Todd (p. 128) had collected Solitary Sandpipers in Newfound-

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land, he probably would have included the species in his report. A Three-toed Woodpecker and an Olive-sided Flycatcher were collected on 12 August on Beaver Mountain. Hermit Thrushes were "fairly common . . . in lumbered forest," where Black-capped Chickadees were found more commonly than Boreal Chickadees, and the relative abundances of these congeneric species reversed in virgin forests. Rooke collected the third Brown Creeper in Newfoundland, though being unaware of Cahoon's and Colburn's unpublished records, considered his skin to be a Newfoundland first. Palm Warblers were "one of the few fairly common birds in the Great Rattling Brook area" and "just as much a bird of the woods as of the open spaces." Two were collected and comprised the third set for the island. Blackpoll Warblers were, in contrast to Griscom's report (1926) of their abundance in western Newfoundland, "surprisingly uncommon" in the central region. House Sparrows were "common . . . at St. John's and fairly common at Grand Falls," whereas juncos were "common around paper mills" and "seemed to decrease in direct proportion to the distance from human habitation." White-winged Crossbills were "commoner" than Red Crossbills.

Three adult male White-winged Crossbills, a male Pine Grosbeak, and a male Red Crossbill were the only birds collected in full breeding condition. Rooke hypothesized that most crossbills, and possibly grosbeaks, in the area were nesting in September. The few data available on this point suggest that most of these finches breed in the spring in Newfoundland, though some breed in the fall. Perhaps the latter are birds producing second or subsequent broods. Godfrey (1966) notes that crossbills may nest in any month of the year.

In September Rooke met J. R. Ewing, a St. John's taxidermist with a keen interest in birds. Ewing gave Rooke a number of skins for the British Museum (see below), and Rooke reported (1935c) on some of Ewing's specimen records in an appendix to his paper.

EARL AMOS BROOKS

Brooks, the state ornithologist of West Virginia, visited Newfoundland briefly from 28 July to 5 August 1932. He produced a short, though one of the first, account of birds on the Avalon Peninsula, recording 41 common species (Brooks, 1936). His Lincoln's Sparrow entry probably represents a misidentified juvenile Swamp Sparrow, that resembles the adult Lincoln's, which only rarely occurs on the Avalon Peninsula in summer. Brooks noted that the "Lincoln's Sparrow" he observed was being fed by a Swamp Sparrow!

JAMES R. EWING, LOCAL TAXIDERMIST AND BIRD ARTIST

Ewing, a local taxidermist, wrote a personal summary of the island's birds that included color plates and some pen and ink sketches for J. R. Smallwood's *Book of Newfoundland* (1937b). His watercolors are now housed at Memorial University. He claimed 131 species in his annotated list, though there

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are only 129 entries. The Common Eider is depicted, but not included in the species accounts. His Swamp Song Sparrow is an odd entry; while it may be a misprint for both species, it is interesting that William A. B. Sclater, an amateur ornithologist in St. John's, also entered a Swamp Song Sparrow in his unpublished notes on Newfoundland birds which were written in about 1920. Ewing and Sclater were probably aware of each other's endeavours.

A dead American Woodcock found by Ewing in autumn 1932 at Quidi Vidi was the first Newfoundland specimen. Two Eurasian Wigeons were reported shot at Bally Haly in October 1936, but Ewing's descriptions are not compelling, and Peters and Burleigh (1951b) did not report them. Oberholser, however, identified two Eurasian Wigeons taken at St. John's in autumn 1935, and it is feasible that these are the birds to which Ewing referred. The first Wood Duck specimen was reported from the Burin area in the early 1930s. Ewing speculated, on the basis of summer occurrences, that the Common Moorhen and Purple Gallinule may nest in Newfoundland; no such evidence has been obtained to date (Appendix I). The Clapper Rail was listed without details, resulting in Peters and Burleigh's (1951b) hypothetical entry for the species. The first Green-backed Heron specimen for Newfoundland was reported taken at Harricott, and a first report of the Chimney Swift is also given, but without details. An adult female Ivory Gull collected in St. John's Harbour on 30 March 1937 was another first Newfoundland specimen. It was sold by Ewing to the British Museum, where it is housed today (P. Colston, pers. comm.). Peters and Burleigh (1949: 176, 1951b: 234) mistakenly claimed to have collected the first Ivory Gull ten years later. A Magnificent Frigatebird obtained at Bonavista Bay and mounted by Ewing is the only Newfoundland specimen.

Some problematic entries include Pied-billed Grebe that was stated to have a red throat and black head in summer (Red-necked Grebe?). Bank Swallows are listed as quite common at Salmonier, though in the absence of a Tree Swallow entry this seems questionable. The Northern Saw-whet Owl, White-breasted Nuthatch, Pine Warbler, and Seaside Sparrow, lacking details, were considered hypothetical by Peters and Burleigh (1951b). The first well-documented observation of Pine Warbler was made in the fall of 1983 by J. Wells and B. Mactavish, and the White-breasted Nuthatch and Seaside Sparrow have not yet been recorded conclusively for Newfoundland.

On 11 September 1934 Ewing gave Rooke some important bird skins for the British Museum. He donated his Green-backed Heron specimen, as well as Sora, Northern Shrike, and Palm Warbler skins, among others (Rooke, 1935c). Ewing later met Peters and Burleigh and also gave them some of his bird skins.

E. T. GILLIARD; GANNETS RECOLONIZE FUNK ISLAND

Gilliard and Samuel K. George visited Funk Island in 1936. They documented the re-establishment of the gannetry, which consisted of seven pairs

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at that time (see p. 154). They also constructed a nearly complete Great Auk skeleton from a collection of between 6,000 and 7,000 bones obtained during their visit.

DAVID C. NUTT AND JOHN W. ALDRICH'S NEWFOUNDLAND BLACK-CAPPED CHICKADEE AND NEWFOUNDLAND ROBIN

As a member of the Robert A. Bartlett Greenland Expeditions of 1937–39, Commander Nutt made brief ornithological visits (13 days total) to Brigus, Hodgewater, and Makinson's Grove on the Avalon Peninsula. Only 37 species (20 by specimens, totaling 82 skins) were recorded. Another 25 days were spent on board ship along Newfoundland's southern and eastern coasts while travelling to and from Labrador and Greenland.

Aldrich and Nutt (1939) concurred with Noble's (1919; see p. 130) observations about the darker plumages of many of the island's birds, and further contended that this trend is more pronounced in eastern than in western Newfoundland, where Noble worked. Black-capped Chickadees, robins, and Savannah Sparrows were examples (cf., Godfrey, 1959). Following Noble's lead, they also suggested that Newfoundland White-winged Crossbills were racially distinct. Two new subspecies were formally described, the Newfoundland Black-capped Chickadee (*bartletti*) named in honor of Captain Bartlett and the Newfoundland Robin (*nigrideus*).

Aldrich and Nutt (1939) stated that according to mariners, petrels bred on Funk Island; it is unlikely that this has ever been the case (see p. 158). Contrary to Austin's (1932) and Gross's (1937) contentions that gannets do not occur north of Belle Isle, these birds were sighted up to 150 miles farther north. This distribution, which is now well substantiated, may be related to a slight warming of the Labrador Current that occurred during the 1930s (Kirkham, et al., 1985; see, also, L. M. Tuck, 1961). Aldrich and Nutt (1939) were led astray by Wynne-Edwards' (1935b) British usage of the term guillemot for murre, and reported a large Black Guillemot colony at Cape St. Mary's. Common Murres were not listed by Aldrich and Nutt (1939), though Thick-billed Murres were.

PERCY ALGERNON TAVERNER'S UNPUBLISHED LIST OF NEWFOUNDLAND BIRDS, 1940

Taverner had a long, illustrious, and productive career as an ornithologist at the National Museum of Canada, where he began working in the early part of 20th century (Ouellet, 1987). He played pioneering roles in bird banding in Canada and in the establishment of the first Canadian bird sanctuaries at Bonaventure Island, at Great Bird Rock, and at Point Pelee. His many books include *The Birds of Eastern Canada* (1919), *Birds of Western Canada* (1926), and *Birds of Canada* (1938). In 1940 Taverner compiled a preliminary list of Newfoundland birds based on records in the National Museum. This unpublished list contains 211 species of which 157 (including the

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presently unconfirmed Great Gray Owl and Carolina or White-breasted Nuthatch) are reported to be of definite occurrence in Newfoundland. Based primarily on his knowledge of the birds that occur in the Gulf of St. Lawrence region, Taverner speculated (1940), usually correctly, about the probable occurrence of hypothetically listed species. Taverner's report also contains a very useful "Bibliography of Birds of Newfoundland to 1940."

EVARTS G. LOOMIS'S AVIFAUNAL REPORT FROM THE GREAT NORTHERN PENINSULA, 1945

Loomis, a doctor with the Grenfell Association in St. Anthony, published (1945) the first report on the avifauna of the Northern Peninsula. His observations were made intermittently from June 1936 to June 1944. Some information obtained from local residents was included. He also made casual sighting of Labrador birds during a six-week summer stay in Indian Harbour in 1935, and during two coastal trips in the association's medical yacht travelling as far as Cartwright in 1936 and to Northwest River in 1940.

Much of Loomis's material was new and interesting. His records gave special attention to migration dates. All told, 98 species were recorded for the St. Anthony area and 11 for Labrador. On the basis of locally obtained information, Red-throated Loons were reported "common and breeding on interior ponds" (see, also, p. 72). The only substantiated nesting record of this species in Newfoundland has been made on the Gray Islands off the eastern coast of the Northern Peninsula (Maunder, 1978). Waterfowl reported nesting by local inhabitants were Canada Geese (Canada Bay), black duck, Green-winged Teal (Ship Cove, Hare Bay), and White-winged Scoter (Hare Bay); there is still no confirmed Newfoundland nesting record for the scoter (Appendix I). Loomis reported sighting a Cooper's Hawk (as had Reeks), which Peters and Burleigh (1951b) considered hypothetical. This accipiter is difficult to differentiate from the Sharp-shinned Hawk, and it has only been reported a few times in Newfoundland. (As there are no specimen or photographic records, doubt about the occurrence of the species is still raised.) Loomis also reported a kestrel, as had Reeks (1869) and Rooke (1935a) before him, though Peters and Burleigh (1951b) considered all these to be misidentifications. In view of the species' abundance in Newfoundland today, the earlier reports may have been accurate. Loomis (1945) also reported the first Newfoundland sighting of a Virginia Rail made on 16 August 1936 at St. Anthony by Dr. E. Burge. Loomis' Killdeer sighting in St. Anthony on 19 November 1940 was the second island record; his observations of three Black-bellied Plovers at Quirpon on 17 August 1936 and of Dunlin on 29 August 1939 were firsts for Newfoundland. He reported the first Red-eyed Vireo and also had sighting of the Chestnut-sided Warbler. Like Cormack (p. 73), Loomis thought that Whimbrels bred in Newfoundland; there is no evidence that they did or do.

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WILFRED R. TEMPLEMAN'S SEABIRD OBSERVATIONS

Templeman, who almost single-handedly pioneered fisheries research in Newfoundland, also has some interesting land and marine bird records to his credit. He prepared the skin of the first Black-headed Gull collected in Newfoundland and gave it to Harold Peters. The gull had been banded as a chick in a colony in Iceland a few months earlier (see p. 179). He collected the first Evening Grosbeak, which was the sole record at the time of Peters and Burleigh's publication (1951b). Today these grosbeaks occur year-round in small numbers (some nest) and are often very abundant in winter flocks at bird feeders in St. John's (see Fig. 36). He was the second scientist to collect a White-rumped Sandpiper on the island. He also tabulated the local names of seabirds in conjunction with his fisheries research in coastal waters (Templeman, 1945).

THE BIRDS OF NEWFOUNDLAND (1951) BY HAROLD SEYMOUR PETERS AND THOMAS DEARBORN BURLEIGH

Peters and Burleigh's book (1951b) is the only one to date that has drawn together existing information on the Newfoundland avifauna. The work presented the first formal accounts of species known to occur in Newfoundland and provided the initial standard by which subsequent bird records were assessed.

Peters and Burleigh worked for the U.S. Fish and Wildlife Service and carried out ornithological research across North America. Burleigh studied the avifauna of Washington (1929, 1930) and wrote *Georgia Birds* (1958) and *Birds of Idaho* (1972). Peters first visited Newfoundland in 1937, and with Gower Rabbitts and Harry Walters laid the groundwork for a cooperative avifaunal investigation by Newfoundland and United States wildlife agencies. Burleigh and Peters also worked in Labrador and on St. Pierre et Miquelon (Lewis and Peters, 1941; Peters, 1944; Peters and Burleigh, 1944, 1951a).

From 1937 to 1947 Peters and/or Burleigh made 13 trips to Newfoundland, visiting different habitats across the island. During 304 field days they collected approximately 2,000 specimens that are housed in the U.S. National Museum of Natural History (Burleigh and Peters, 1948; Peters and Burleigh, 1951b). Their collecting efforts yielded 12 first specimen records for Newfoundland, six second records, and four thirds (Table 12). They also made the first formally substantiated sightings of Willet, Ruddy Turnstone, and Semipalmated Sandpiper, as well as the second Newfoundland observations of Bufflehead and Piping Plover.

Like Noble (1919) and Aldrich and Nutt (1939) before them, Burleigh and Peters were acutely aware of plumage differences between Newfoundland and mainland populations. They used their specimens to propose seven new insular subspecies, viz., Boreal Chickadee, Winter Wren, Hermit Thrush,

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Swainson's Thrush, Northern Waterthrush, Rusty Blackbird, and Purple Finch (Burleigh and Peters, 1948; Peters and Burleigh, 1951b). In 1951, when *The Birds of Newfoundland* was published, it was thought that about 20% of the species known to breed on the island were racially distinct. Most of the proposed subspecies have not, however, stood up in the face of subsequent investigation. For instance, Godfrey (1959) accepted only the *crymophila* subspecies of the Hermit Thrush, while rejecting Peters and Burleigh's subspecific designations for Boreal Chickadee, Swainson's Thrush, Northern Waterthrush, and Purple Finch, and he questioned their proposals for the Winter Wren and Rusty Blackbird. Bond (1962) proposed a Newfoundland subspecies of the Blue Jay that was based on specimens collected by Burleigh and Peters, and named *burleighi* in Thomas Burleigh's honor. More recent biological research places less emphasis on minor variation in morphology, and little attention is paid to such subspecific descriptions today (see p. 189).

In addition to field work, Peters and Burleigh's background preparation for their book involved checking the collections at Canadian and United States natural history museums, as well as the British Museum (Natural History), appraising unpublished records of reliable observers, and searching the ornithological literature for previous Newfoundland findings. *The Birds of Newfoundland* is greatly enhanced by 32 color plates executed by Roger Tory Peterson. All told Peters and Burleigh compiled accounts that included status, occurrence, and natural history information for 227 accepted taxa (215 species and 12 subspecies), and also for 55 species (and one subspecies), which were not supported by specimen records, and were therefore considered to be of hypothetical or unconfirmed occurrence. Forty-seven year-round residents, 74 summer residents, 17 winter residents, 14 migrants, 63 vagrants (or "accidentals"), and two extinct species were included in their accounts of species known to have occurred on the island. The number of species known from Newfoundland has increased greatly since this initial compilation.

TABLE 12. First, second, and third specimens records for Newfoundland obtained by Peters and Burleigh.

FIRST RECORDS	SECOND RECORDS	THIRD RECORDS
Great Cormorant	Ring-necked Duck	Blue-winged Teal
Black-bellied Plover	Sanderling	White-winged Scoter
Lesser Yellowlegs	Red-necked Phalarope	Sora
Red Knot	Ivory Gull	White-rumped Sandpiper
Dunlin	Cedar Waxwing	
Short-billed Dowitcher	Red-eyed Vireo	
Eastern Kingbird		
Bank Swallow		
European Starling		
Solitary Vireo		
Rose-breasted Grosbeak		
Chipping Sparrow		

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WILLIAM EARL GODFREY'S MODERN CANADIAN OVERVIEW

Under Godfrey's direction, Henri Ouellet and Raymond McNeil of the National Museum of Canada carried out an extensive ornithological collecting trip to Newfoundland during the summer of 1959. The specimens, combined with some other skins collected during the museum's mammalian fauna expeditions to the island in 1949 and 1950, provided the basis for a paper by Godfrey (1959) that critically reassessed subspecific radiation in Newfoundland. Taking an exacting toll on previously proposed insular subspecies, he (as indicated above) accepted only one of Peters and Burleigh's (1951b) designations, the Hermit Thrush. He also suggested that there may be an incipient insular race of Blackpoll Warbler but did not go so far as to propose one.

Godfrey, who is presently Curator Emeritus of Birds at the National Museum of Canada, wrote *Birds of Canada* (1966, 1986). The first edition provided some significant updating on Newfoundland and Labrador bird occurrences, most of which came from Leslie Tuck.

GEORGE LESLIE MILLS TUCK AND LOCAL ORNITHOLOGICAL RESEARCH

A Newfoundlander born and bred, Leslie Tuck achieved the highest goals of scientific excellence and acclaim. Since his early boyhood in Shoal Harbour, Trinity Bay, he showed a deep interest in nature. His systematic study of birds began in earnest while he worked as a photographer from 1941 to 1948 at the U.S. Naval Base in Argentina. In 1948 he published an annotated compilation of 101 species that occur in the Argentina area, information that Peters and Burleigh (1951b) drew heavily upon.

When Newfoundland and Labrador joined the Canadian Confederation in 1949, Tuck was appointed as the province's first Dominion Wildlife Officer. In 1950 he was a founding member of the re-established Natural History Society of Newfoundland and Labrador, and initiated the modern era of Christmas Bird Counts on the island. The Society and the counts are still active today.

Tuck's first research love was seabirds, especially the murres, which he studied throughout the 1950s in Newfoundland, Labrador, and the Canadian Arctic, where he pioneered seabird study (Fig. 22). His murre investigations culminated in 1961 with the publication of *The Murres, Their Distributions, Populations and Biology—A Study of the Genus Uria*. This book, the first monograph of the new Canadian Wildlife Service Monograph Series drew wide acclaim, including the praise of Prime Minister John Diefenbaker. The Wildlife Society honored it as the outstanding book of the year in ecology and wildlife management.

For a change of ecological perspective, Tuck initiated studies on Common Snipe in the late 1950s. This research, which took him from his murre study sites on coastal islands and in the arctic to interior boglands and more tropical study sites, continued for more than a decade. In 1972 he published a



FIG. 22. Leslie Tuck on Funk Island; Common Murres enshrouded in fog in background.

synthesis, *The Snipes—A Study of the Genus Capella*, the fifth publication in the Canadian Wildlife Service Monograph Series. Like his previous book published 11 years earlier, this one also received the Wildlife Society's Out-

NEWFOUNDLAND ORNITHOLOGY IN THE TWENTIETH CENTURY

standing Publication of the Year Award. With this bestowal, Tuck became the only two-time recipient of the award.

Tuck had studied at Harvard University (1936–38), though he did not complete an undergraduate degree. Formal academic recognition of his work came later in 1965, when Memorial University of Newfoundland awarded him an honorary Doctorate of Science. Acadia University of Nova Scotia conferred an honorary D.Sc. on him in 1977, the same year that he was appointed as J. L. Paton Research Professor in the Department of Psychology at Memorial University. Here he took up work on the manuscript that has developed into the present publication. As a consequence of Tuck's long and illustrious career, ornithological research now has an established solid base in Newfoundland and is no longer solely the province of visiting scientists.

In 1967 Tuck presented the first formal updating of the island's avifauna since Peters and Burleigh's book (1951b) with the publication of an annotated complete species list in J. R. Smallwood's Volume 3 of *The Book of Newfoundland*. He also published that year the first Field Checklist of Newfoundland Birds, prepared for the Natural History Society. He recorded 268 species (and one subspecies, the European Green-winged Teal, *Anas crecca crecca*); this was 53 species more than Peters and Burleigh's total of 215 accepted extant species (L. M. Tuck, 1967a). Of the additional species, 34 are best classified as vagrants, three were introduced after Peters and Burleigh's time (Spruce and Ruffed Grouse, Ring-necked Pheasant), and 16 can be considered seasonal or year-round residents. At least ten of the resident species are known, or highly suspected, to breed. Tuck (1967a) confirmed 16 species that were considered hypothetical by Peters and Burleigh. He cautioned that these changes should not be construed as recent increases in the island's species diversity, but rather were the result of greater observer coverage since Peters and Burleigh's earlier effort.

The next revisions of the Natural History Society's Checklist were made by Tuck and Maunder (1975), Maunder and Montevicchi (1982), and Maunder et al. (1986). The 1975 species total was 292, a net gain of 27 species over Tuck's (1967a, b) compilation. Again as expected, almost all (85%) of the newly-added species can be categorized as vagrants. By 1982 the species total was 311; 90% of the added entries were vagrants. The 1986 checklist contains 21 additional species entries, all vagrants (see Appendix I).

Newfoundland's avifauna is much better known than ever before, but change and new discoveries are the rules. Observer efforts have increased steadily and dramatically since the late 1940s. These efforts are partially reflected in the large increases in vagrants on the island's checklists in recent decades (Fig. 23); more eyes pick up more strays (see, also, p. 200). Most observers bird watch on the Avalon Peninsula on the east coast and in its associated habitat and coastal areas. In comparison with other more heavily populated North American areas, Newfoundland's best coverage is very sparse. As bird watching and study continue to increase in popularity, the number of keen

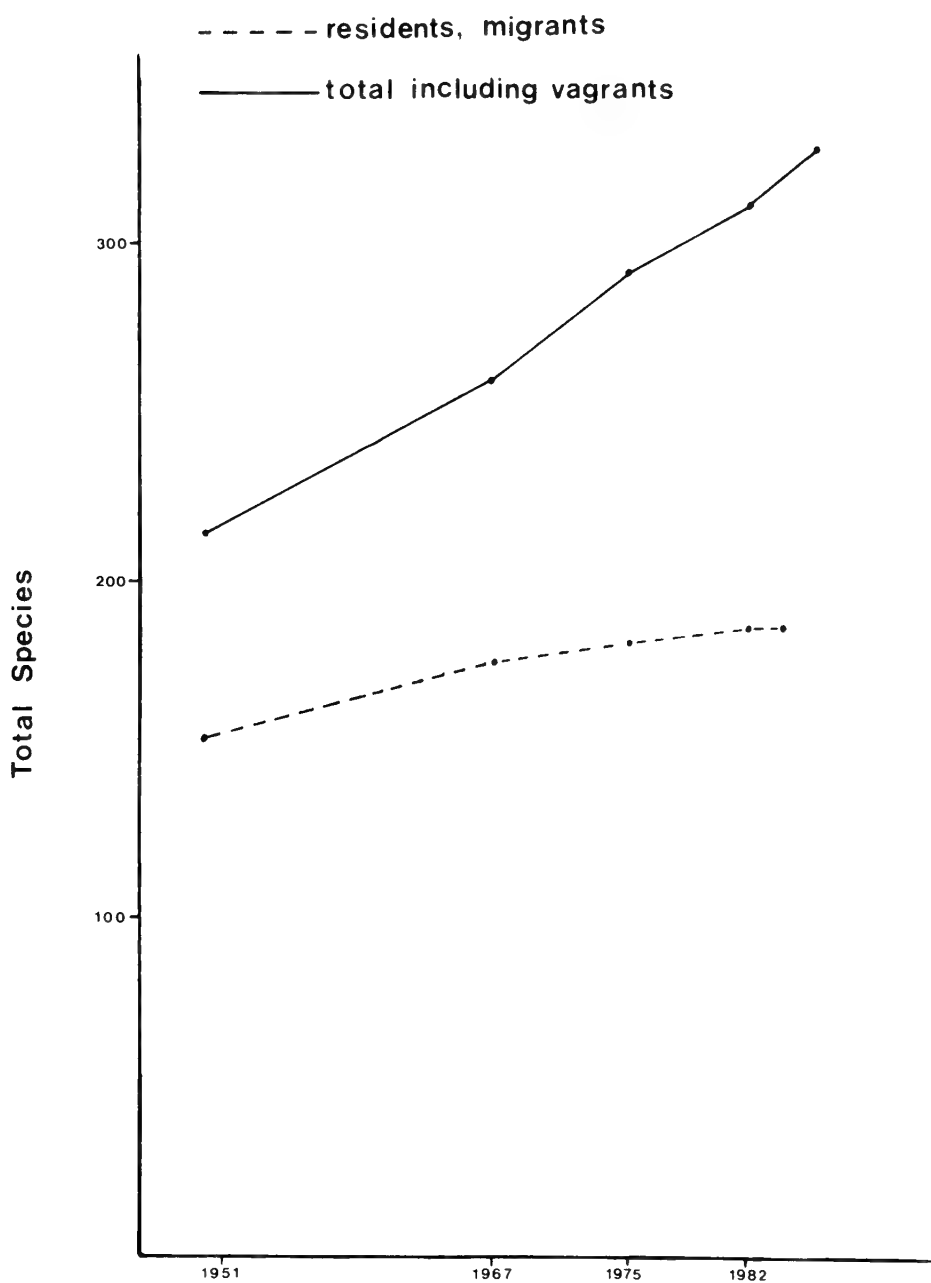


FIG. 23. Cumulative totals of species reported by Peters and Burleigh (1951b), L. M. Tuck (1967a), Tuck and Maunder (1975), Maunder and Montevecchi (1982), and Appendix I.

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observers will rise, and more “birding” tourists will visit. Concurrently, the number of species known to occur on the island will continue to climb and more details of their biologies and ecologies will be revealed.

TWENTIETH CENTURY SPECIES OCCURRENCES

In concluding our treatment of the diversity of species occurrences during the present century, we emphasize that the number of species known to have occurred in an area is often a very incomplete and superficial measure of avifaunal richness. Yet, by the same token, such findings, which are often a function of the level of observer effort, are a very important aspect of ornithology. In the context of broad geographic comparisons, the occurrences of transients and more permanent immigrants, as well as range retractions, reveal patterns of continental and intercontinental movement that help to integrate a wealth of diverse and heretofore seemingly unrelated observations (see, p. 200). Early records often add a highly informative temporal dimension to current occurrences; systematic records kept now will provide baselines with which to assess future changes.

In recent decades avian research has focused on the more complex analyses of demography, community structure, reproductive energetics, habitats, food requirements, etc. All these sources of information and others are prerequisite for a comprehensive understanding of avian biology and ecology.

SEABIRD COLONIES

Three ecological factors, viz., food, predation, and nest site availability are the primary determinants of the distribution, size, and species composition of marine bird breeding communities. Owing to predation pressure, including human exploitation and disturbance, seabird colonies tend to be in relatively inaccessible locations, such as on islands and cliffs. Colony location and size are also strongly influenced by oceanic productivity. The cold arctic waters of the Labrador Current wash the northern and eastern coasts of Newfoundland and produce a nutrient-rich sea in which zooplankton, fish, and marine birds and mammals abound. Major seabird colonies lie along Newfoundland's east coast (Fig. 24; Threlfall, 1983), and smaller colonies can be found on other coasts. Circumstantial reports (e.g., Griscom, 1926) mention colonies on the west coast that were extirpated by unrestricted hunting and exploitation.

The need to replenish food supplies after long trans-Atlantic voyages from the Old World made colonial seabirds a highly valued commodity for early New World travelers. As a result, the earliest North American records of species composition and abundance at some marine bird colonies were made in Newfoundland. For Funk Island the reports date back over 450 years.

Here we review what is known about historical trends in populations and changing species diversity at the major seabird breeding sites: Funk Island, the Wadham, Penguin and Cabot Islands, Baccalieu Island, the Witless Bay Islands, and Cape St. Mary's.

FUNK ISLAND, THE FIRST EXPLOITED SEABIRD COMMUNITY IN THE NEW WORLD

BY

W. A. MONTEVECCHI AND I. R. KIRKHAM

"The Funks," an 800×400 m granite rock and two small nearby rocky outcroppings located about 60 km NNE of Cape Freels, Bonavista Bay (Fig. 11), were probably first sighted by Europeans when Cortereal sailed to Newfoundland in 1501. Indication that Funk Island was discovered at this time comes from a Portuguese chart drawn in about 1503 by Pedro Reinél (Harrisse, 1900), on which an *Y.-dos-Aves*, or Island of Birds, is shown in the approximate location of Funk Island.

The northeastern head, the island's highest point at 14 m above sea level, is split by an east-west fault that terminates in Indian Gulch, a rugged inlet where Beothuk artifacts have been found (Lloyd, 1875). The Bench, a narrow ledge on the northeastern head, is the preferred landing spot. Landing Rock, in a small cove on the southwestern side, was used by Cartier and is likely the site where early visitors, such as Whitbourne, herded flightless Great

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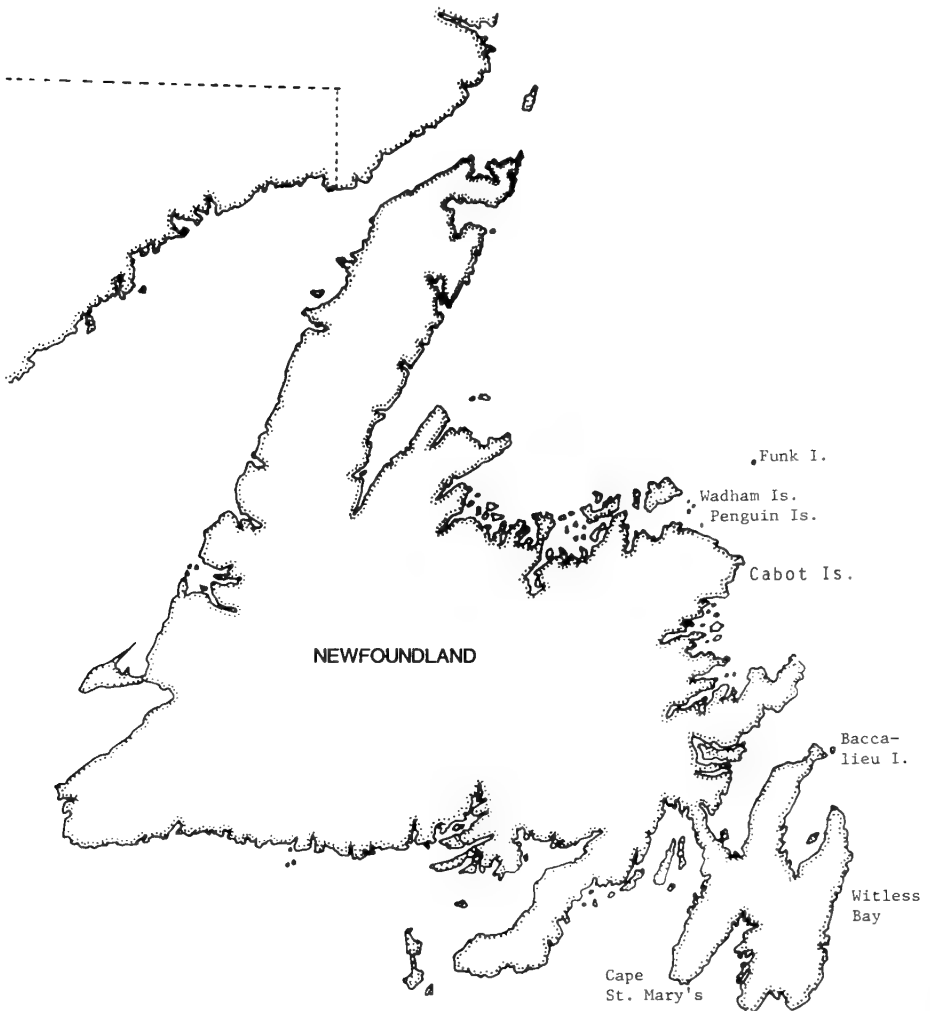


FIG. 24. Major seabird colonies in Newfoundland.

Auks into waiting boats (see below). The northeastern, southeastern, and southwestern sides are precipitous, being 6 to 10 m above sea level. The northwestern shore, in contrast, slopes gradually into the sea and is probably where the Great Auks swam ashore.

The island's name is derived from an old English term which means foul-smelling or place of panic. The guano produced on this small island by more than a million seabirds, mixed with rotting eggs and fish debris, can easily account for the first meaning, especially on a hot still day or if one sails in the lee of the island. Legends and folklore emphasizing the shady mysteries and awesome nature of Funk Island fulfill the second definition (Russell,

1965). The last known North American, and likely the largest nesting ground of the Great Auk in the world, Funk Island is a powerful natural monument to the species' tragic demise. Place names like Penguin Islands, located off the northeastern and southwestern coasts of Newfoundland, suggest that Great Auks may have also nested on or at least visited these places (Stuwitz, *in* Steenstrup, 1855; see p. 89).

Funk Island and its birds were first described in 1534 and 1535 by Jacques Cartier, who landed there to replenish fresh meat supplies on his New World voyages. Cartier's well-written descriptions provide a rare starting point from which to document historical changes in the marine bird community of Funk Island (Biggar, 1924).

We have made special efforts to standardize information contained in diverse and often obscure accounts of Funk Island. Second hand information, speculation, and exaggeration are rampant in historical accounts (e.g., Thomas, 1794–95) as well as those of recent times (e.g., Bruemmer, 1971; Mowat, 1984), and also vary greatly in reliability, uniformity, and precision. We eliminated questionable material and restricted ourselves to published reports by individuals who had landed on the island and recorded species occurrences or abundance, or who had documented the presence of Great Auks elsewhere in Newfoundland. The only exceptions are Wynne-Edwards (1935b), who passed by the island in 1934, and Templeman (1945), who was unable to land because of rough seas, but made observations of breeding birds from a boat about 100 m offshore.

From this material we drew inferences about population sizes and the relative abundance of different species. Early estimates were undoubtedly based on subjective impressions. Later ones may have involved rough or partial counts, but the most recent figures are based on standardized procedures or complete counts. However, the different procedures used in counting and in generating estimates are often not strictly comparable. When inferences as to abundance were not possible, but a species was recorded, we simply noted its presence. Conversely, when a species was stated to be absent, or was not mentioned in what was considered to be a comprehensive attempt to give a full avifaunal presentation, we considered it to be absent. We counted six of the nine marine species (fulmar, gannet, Herring and Great Black-backed Gulls, kittiwakes, and puffins) that nest on the island today, and for three other species (Razorbills, Common and Thick-billed Murres) we used the most recent counts or estimates of other researchers.

Kirkham and Montevecchi (1982) presented the first historical analysis of the Funk Island seabird community. We draw on that account and update it with data collected after 1981.

Former breeders: Great Auk.—Funk Island was probably the site of the largest Great Auk colony in the world (Steenstrup, 1855; Grieve, 1885). There were many tens of thousands of nesting pairs and there may have been more than 100,000 pairs. As indicated in Chapter 3, these birds were exploited in

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prehistoric times by the Maritime Archaic People, Dorset Eskimos, and Beothuks. The latter group may have made a visit or two to Funk Island each summer to harvest eggs (Cartwright, 1792). Cartier, Hore, Gilbert, and Whitbourne all took auks and other Funk Island seabirds for fresh meat; some were salted for later use. Whitbourne (1622) recorded that Great Auks "multiply . . . infinitely" on Funk Island and that they were driven "hundreds at a time" down gangplanks into waiting boats. His often quoted statement ". . . God had made the innocency of so poor a creature, to become such an admirable instrument for the sustenance of man" still stands as a resounding epitaph.

Flightlessness and aggregation at a very limited number of breeding sites were responsible for the auk's vulnerability to unchecked exploitation. The Great Auk was convergent in anatomy, and in breeding and feeding ecology, with the southern hemisphere penguins, to which it is unrelated. The name "penguin" was first used to refer to the Great Auks of the North Atlantic and was later applied to present-day penguins when European explorers ventured into southern oceans. "Penguin" has a number of possible derivations. In Welsh it means "white head," a term that might have been applied to the Great Auk, which has large white spots in front of its eyes (see Frontispiece). Latin "penguis" means fat or grease and is certainly an appropriate description for the species (Choate, 1973). "Pin-winged," "pen-winged," and "pinioned," in reference to the Great Auk's disproportionately small wings, are other possible origins of "penguin."

From the 16th through 18th centuries the Great Auks of Funk Island were relentlessly persecuted for feathers, meat, fat (oil), and bait. Portuguese, English, French, and Spanish crews fishing in Newfoundland and Labrador waters regularly took Great Auks for meat. On Funk Island the birds were herded into stone pounds, killed, and then scalded in large caldrons (Allen, 1876). Owing to the lack of wood on the island, the fat-laden birds were also used to fuel the fires (Harvey, 1892). After plucking and rendering, most carcasses were discarded in heaps; today their remains form the substrate of the grassy meadow that surrounds the cairn on the western side of the island, the graveyard of the species (Fig. 14). Occasionally auks were buried intact, and some of these were later uncovered in mummified form (Lucas 1890). Lucas's map, made during the Grampus Expedition of 1887, indicates the locations of the pounds, huts, and other island landmarks (Fig. 25). The perimeters of the pound are still visible today.

In response to Cartwright's early warnings about the Great Auks' precarious status in 1785, a ban was placed on bird and egg exploitation during the breeding season. Early conservationists took hard-line approaches, and prohibitions were enforced with harsh penalties, such as public floggings (Elliot, 1786). Legislative and punitive actions came too late, however, and the Great Auks of Funk Island were extirpated by the early 1800s. What is known of historical fluctuations in the population levels of Great Auks and other seabirds on Funk Island is summarized in Table 13. The last defini-

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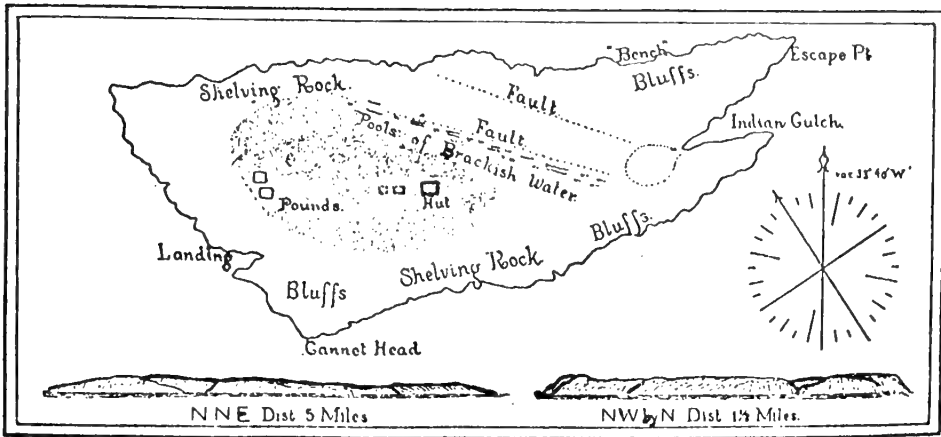


FIG. 25. F. A. Lucas's (1890) map of Funk Island.

tively recorded living pair of Great Auks was killed in 1844 on Eldey Island, Iceland (Grieve, 1885). Unsubstantiated reports of Great Auk sightings on the Grand Banks (1852) and in Trinity Bay (1853) were probably misidentifications (Newton, 1861; Peters and Burleigh, 1951b).

Arctic Tern.—This is the only tern known to have nested on Funk Island, though Stuwitz reported both Arctic and Common Terns in 1841 (see below). Large numbers of Arctic Terns were reported in the late 1800s. In 1934 Wynne-Edwards estimated that 1,000 pairs were nesting, yet less than a decade later Peters and Burleigh (unpubl. field notes, 1945) recorded only 20–30 adults flying over the island and “could find no nests or young after careful search.” The terns were last observed nesting on Funk in 1952, when L. M. Tuck counted 17 pairs (Table 13). Many terns, including Arctics, often change colony sites, especially if disturbed (McNicholl, 1975). The reason for the disappearance of terns on Funk Island is not clear, although human disturbance, predation by *Larus* gulls, shifts in food distribution, and interspecific nest-site competition with Common Murres are possibilities. We have frequently observed adults and juveniles flying over the island, and it is quite possible that Arctic Terns may again return to nest on Funk Island.

Stuwitz's report (*in* Steenstrup, 1855) of both Arctic and Common Terns on Funk Island in 1841 is the only one for the latter species. In Table 13 we did not include Common Terns as previous breeders, because it seems unlikely to us that these birds would nest so far from coastal waters, because these congeneric species are difficult to differentiate in the field, and because only Arctic Terns were present when Milne (1875) made the next visit after Stuwitz.

Other Possible Previous Breeders.—Common Ravens may have nested on Funk in recent years. We observed what we believe to have been a raven's nest at

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TABLE 13. Compilation of historical counts and estimates of the breeding birds of Funk Island¹

YEAR	FORMER BREEDERS		CURRENT BREEDERS										SOURCES ²
	GREAT AUK	ARCTIC TERN	NORTHERN FULMAR	NORTHERN GANNET	HERRING GULL	GREAT BLACK- BACKED GULL	BLACK- LEGGED KITTIWAKE	COMMON MURRE	THICK- BILLED MURRE	RAZORBILL	ATLANTIC PUFFIN		
1534	large no.			+				+				1,12	
1535	large no.			+				?				1,12	
1615	large no.			?				?				2	
1767	+			?				?				3	
1785	small no.			?				?				4	
1818-23	0			?				?				5	
1826-31	0			?				?				6	
1841	0	+		0				+			+	7	
1874	large no.			0				large no.		small no.	+	7	
1887	large no.		0	0	?	0	?	small no.		small no.	large no.	8	
1934	~1,000			?	few	+	1,000	5,000				9	
1936	?		0	7	?	+	+	~10,000		+		10	
1940	?		?	100	?	?	+	large no.		~10	+	11	
1945	0	0	0	200	0	0	<1,000	15,000		250	1,000	12	
1951	0	0	0	150-500	small no.	?	1,000	40,000	>75	500	1,000	13,14	
1952	17		0	600-800	+	?	+	50,000	+	+	+	13,14	
1953	0	0	0	600-800	+	?	+	25-60,000	200	+	+	13,14	

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	0	>1,204	25	5	500	60-150,000	250	50	1,000	13,14
1956	0									
1958	0	2,601	+	+	+	400,000	+	>200	+	13
1959	display	2,768	+	+	175	500,000	250	+	1,000	13
1967	display	2,960	+	+	175	+	250	200	1,000	14
1969	0	2,796	<-----15----->		>100	+	+	200	500-1,000	14,15,16
1970	?	2,760	+	+	+	396,461	+	+	+	14,17
1972	0	4,051	+	+	+	+	+	+	+	16
1975	1	3,933	+	>100	+	+	+	+	+	18
1977	3	+	+	+	+	+	+	+	+	19
1978	6	3,871	+	+	608	+	+	+	+	20,21
1979	7	+	+	+	810	+	+	+	+	21
1980	9	+	>100	>100	+	+	+	+	+	18,21
1982	8	+	+	+	+	+	+	+	+	22
1983	11	+	+	+	+	+	+	+	1,600	22
1984	9	6,075	+	+	+	+	+	+	+	22
1986	18	+	>200	>175	+	+	+	+	+	24
Current	18	6,075	>200	>175	810	396,461	250	200	1,600	23

¹All numbers refer to pairs. + refers to a breeding species, when no indication of population size was given in the original account. ? refers to a species as possibly breeding, when an original account was ambiguous or lacking. See text for further explanation.

²(1) Biggar, 1924; (2) Whitbourne, 1622; (3) Lysaght, 1971; (4) Cartwright, 1792; (5) Forbush, 1912; (6) Allen, 1876; (7) Stutz, in Steenstrup, 1855; Milne, 1875; (8) Lucas, 1888, 1890; Palmer, 1890; (9) Wynne-Edwards, unpubl. field notes; Johnson, 1940; (10) Gilliard, 1937; (11) Templeman, 1945; (12) Peters and Burleigh, 1951b; (13) L. M. Tuck, 1961; Garrity, 1960; (14) L. M. Tuck, unpubl.; (15) Nettleship, 1972; (16) Brown, et al., 1975; (17) Birkhead and Nettleship, 1980; (18) Nettleship, pers. comm.; (19) Montevecchi, et al., 1978; (20) Montevecchi, et al., 1980; (21) Kirkham and Montevecchi, 1982; (22) Montevecchi and Wells, unpubl.; (23) Nettleship and Chapdelaine, unpubl.; (24) Montevecchi, unpubl.

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the same cliff site in the northern fault near Indian Gulch in 1978 and in 1979. This coincided with several sightings of ravens, one of which was of a bird that flushed off the presumed nest. A pair of ravens was present on the island in August of 1984 and of 1986. This is the only evidence of a non-marine bird having nested on Funk Island, though many vagrant land-birds have occurred.

Current breeders: Northern Fulmar.—Fulmars are the most recent immigrants to nest on the island. They were first observed displaying there in 1959 by James Fisher and L. M. Tuck, and the first breeding pair was found in 1975. By 1986 the nesting population had increased to 18 pairs (Fig. 26). Fulmars on Funk Island nest on the ground, mostly under overhanging rocks in the grassy area (Fig. 27).

Fulmar breeding ranges are expanding southward on both sides of the Atlantic, and populations have increased markedly in recent decades (Rees, 1965; Fisher, 1966; Dunnet, 1977; Lock, 1979; Anderson, 1982). These population increases have been associated with the species' exploitation of offal from offshore fishing vessels. There is a very strong link between the abundances of both fulmars and kittiwakes on the Grand Banks and the relatively recent increase in fishing and processing there. All the fulmars nesting in Newfoundland (Funk, Baccalieu, and Great Islands) are light-phase birds. Banding returns of fulmars in the northwestern Atlantic come from western Greenland, Iceland, and Great Britain (Salomonsen, 1965; Brown, 1970; L. M. Tuck, 1971; Montevecchi, et al., 1978; Van Franeker and Wattel, 1982).

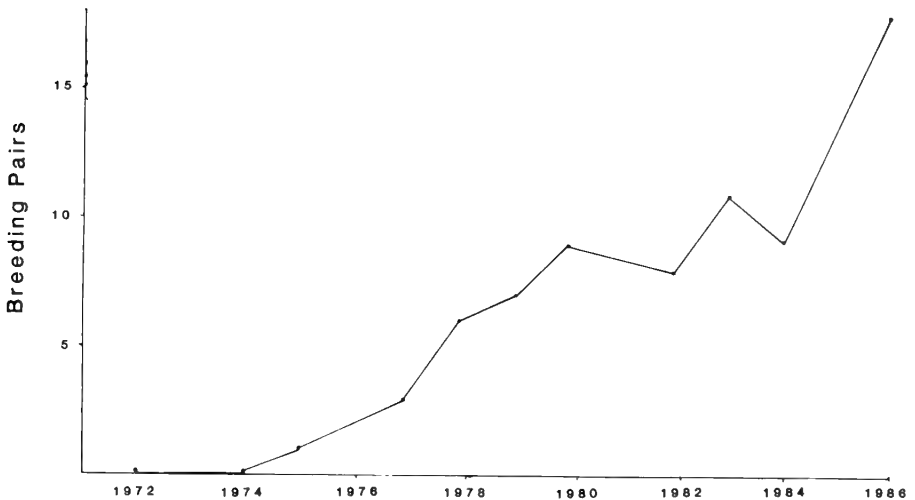


FIG. 26. Population of Northern Fulmars nesting on Funk Island, 1972–86.



FIG. 27. Young Northern Fulmar chick on Funk Island (photo: WAM).

Few fulmars have been banded in the eastern Canadian Arctic, however, so we cannot be certain about the occurrence of birds from the Canadian Arctic in Newfoundland. Present populations of nesting fulmars in Newfoundland are well below the levels that the occupied sites can support. We expect that fulmars will continue to increase on Funk Island and elsewhere.

Northern Gannet.—Cartier noted nesting gannets when he visited in 1534. Some were apparently still there at least until 1857 (Lucas, 1888), but the colony had disappeared sometime before Milne's visit in 1874. On Lucas's map the southwestern point of the island is designated Gannet Head (Fig.

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25; cf. Birkhead and Nettleship, 1980). The disappearance of the gannetry may well have been related to human destruction and exploitation that coincided with the persecution of the Great Auk. Fishermen had little regard for gannets, because they were viewed as competitors for mackerel and herring, and were believed to usurp nest sites from murres (L. M. Tuck, 1961; see Cape St. Mary's account below). Gannets were often used as fish bait. In 1934 Wynne-Edwards (1935b) sailed by Funk Island and saw no gannets, although two years later Gilliard (1937) landed and counted seven nesting pairs and about 40 birds on the western part of the island. Believing that Wynne-Edwards had passed to the north, Gilliard (1937) suggested that he would not have seen gannets even if they had been present. Wynne-Edwards wrote to Templeman (1945) that he had rowed completely around the island and was convinced that had any gannets been there he would have seen them. Gilliard (1937) speculated that the protection afforded Funk Island by legislation, local superstition, and dangerous surrounding waters might permit a population increase similar to that previously recorded at Cape St. Mary's (see below). He has been proven correct. The colony's re-establishment and growth may also have been related to a warming of the Labrador Current that allowed a more northerly migration of the gannets' primary prey, warm-water mackerel (L. M. Tuck, 1961; Kirkham, et al., 1985; see, also, Brun, 1974).

Since the gannetry was re-established, the population has increased steadily and stood at about 3,900 pairs in 1978 (Fig. 28). The colony has continued to grow and by 1984 an aerial photographic count showed 6,075 nest sites holding pairs of birds (Nettleship and Chapdelaine, unpubl.). The max-

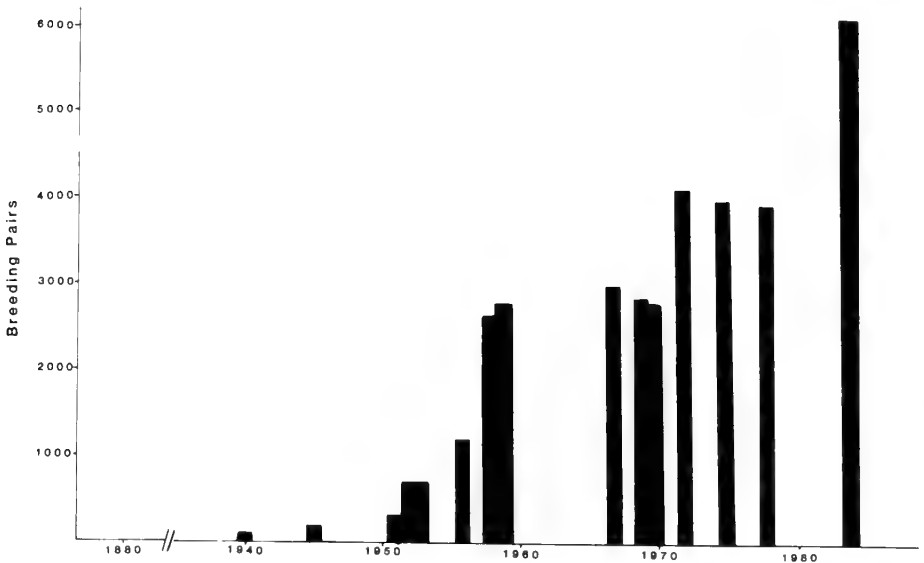


FIG. 28. Growth of the Northern Gannet colony on Funk Island, 1874–1984.

SEABIRD COLONIES

imum potential reproductive output of the seven pairs recorded by Gilliard in 1936 cannot account for the growth rate of the colony, so immigration had to play a significant role in this increase. Owing to predation, Northern Gannets typically nest on steep ocean-facing cliffs (Nelson, 1978; Montevecchi and Wells, 1984a); the Funk Island gannetry is unusual (unique in North America) in that it is distributed entirely over flat terrain.

Herring and Great Black-backed Gulls.—These birds probably began nesting on Funk Island within the last three decades and have increased in recent years. In 1934 Wynne-Edwards (Peters and Burleigh, unpubl. field notes) recorded a “few” Herring Gulls “probably breeding” and also saw a single Great Black-backed Gull. Tuck (1961) reported that these gulls did not have a significant predatory impact on nesting murres, and Nettleship (1972) used Funk Island as a predator-free control site in his study of puffin nest site selection and gull-puffin interactions. This is no longer the case. Since 1977 we have observed extensive gull predation on Common Murre eggs and on murre and puffin chicks (Fig. 29). Many gulls loiter about the puffin colony and kleptoparasitize incoming food-laden parents.

Black-legged Kittiwake.—These pelagic gulls have been breeding on Funk Island for at least 50 years and may have first arrived when foreign fisheries moved onto the Funk Banks. In 1934 Wynne-Edwards reported fewer than 1,000 nesting pairs on the north side of the island (Peters and Burleigh, unpubl. field notes), where most nest today. Kirkham and Montevecchi (1982) made the first direct counts in 1978 and 1979 (Table 13), all previous figures being simple estimates. The kittiwakes and Thick-billed Murres are the only seabirds that nest exclusively on the island's cliffs.

Common Murre.—Common Murres were present during Cartier's visit of 1534 (L. M. Tuck, 1961: 57) but not noted again until 1874 when Milne (1875) reported “large numbers.” Lucas (1888: 135) reported “few murres . . . twenty years ago one boat took away eleven barrels of eggs . . . this year it is . . . doubted if (aside from the puffins) there have been two barrels laid on the island.” He speculated that intensive egging activity may have been responsible for the decline. Since that time the murres have increased dramatically. In the 1950s there were three distinct colonies in the center and at the southwestern and northeastern ends of the island (L. M. Tuck, 1961). Today there is a continuous belt of nesting Common Murres that runs the entire length of the island (Fig. 30). This colony comprises about 80% of the western North Atlantic population (Birkhead and Nettleship, 1980; Fig. 31). Almost all the birds lay their eggs on flat terrain, a relatively unusual habit for the species (see p. 160).

Thick-billed Murres.—First reported breeding in 1951, the only concentration of these murres is on a narrow ledge at the mouth of Indian Gulch. This nesting site can only be seen from one or two locations, and these birds could have been easily overlooked in previous surveys (e.g., Lucas, 1890;



FIG. 29. Great Black-backed Gull carrying a Common Murre egg on Funk Island (photo: WAM).

Gilliard, 1937; Peters and Burleigh, 1951b). The population, unlike that of their congeneric relatives, has remained relatively stable; L. M. Tuck (1961: 59) reported that their numbers "did not change appreciably" from 250 pairs between 1951 and 1959. Their abundance is similar today. The selection of breeding sites by Thick-billed Murres is much more restricted than that of Common Murres (L. M. Tuck, 1961), and the scarcity of ocean-facing cliffs may sharply limit the population on Funk Island. The species' breeding range is concentrated in the Arctic, and Funk Island lies close to the southern limit (L. M. Tuck, 1961; Brown, et al., 1975; Gaston and Nettleship, 1981).

Razorbill.—Milne (1875) provided the first report of Razorbills and puffins on Funk Island. The variable population estimates of these crevice and burrow nesters probably is a reflection of the difficulty in locating nests and differences in the diligence of various observers.

Atlantic Puffin.—First documented on Funk about 75 years after the obliteration of the Great Auks, puffins burrow in the grassy turf that has de-

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FIG. 30. Common Murres breeding on Funk Island, 12 July 1972 (photo: LMT).

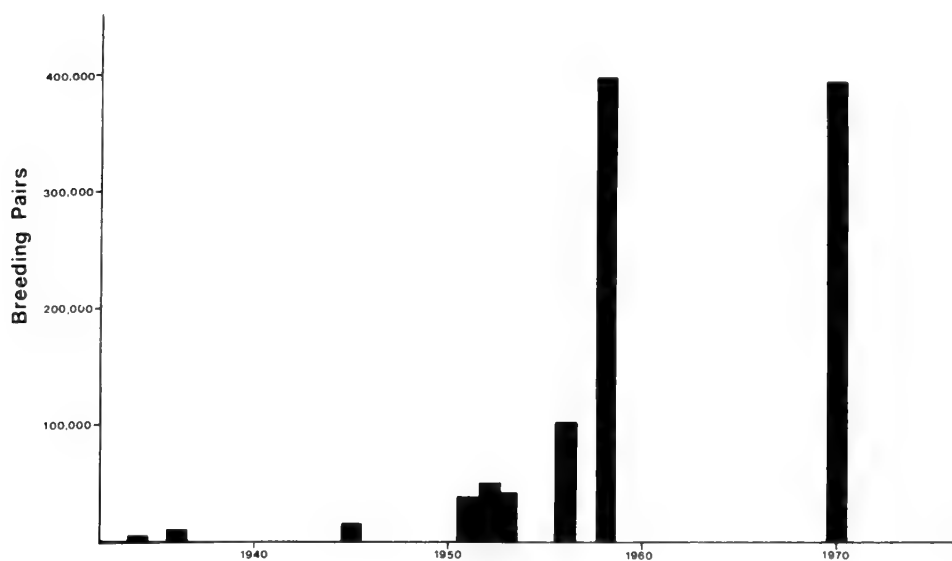


FIG. 31. Estimated populations of the Common Murre colony on Funk Island, 1934–1970.

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veloped where the auks once nested. Almost all recent estimates of the nesting population have been 1,000 pairs. In 1983 Montevocchi and J. Wells made area measurements, sampled occupied burrow densities in different areas, and estimated a breeding population of 1,600 pairs. Owing to limited nesting habitat, the population has probably been stable for some time and has little potential for growth.

The Black Guillemot is the only alcid breeding in Newfoundland that is not known to have nested on Funk, though immatures have been sighted around the island in recent years. Leach's Storm-Petrels are also observed in the area but do not nest on Funk Island, although erroneously reported to do so by Aldrich and Nutt (1939).

Historical analysis.—The seabird inhabitants of Funk Island have been exploited over the centuries by Indians, explorers, colonizers, fisherman, and coastal residents. The effects of these incursions are seen in terms of extinction (Great Auks), colony desertions (gannets, terns), and population declines (murre). Ainley and Lewis (1974) found similar effects of human intervention in their historical analysis of the seabird community of the Farallon Islands outside San Francisco Bay. The intense and protracted persecution directed at the Great Auk over the centuries led Innis (1940: 26) to observe that "the wonder is not that the Great Auk became extinct but that it survived as long as it did."

Local commerce in feathers and fat signed the death sentence for Funk Island's flightless "penguins." Following their extinction, soil from their decomposed bodies and guano was removed in 1863 and sold as fertilizer in St. John's, Baltimore, and Washington, D.C. (Lucas, 1890). The seabird community was probably at its lowest ebb in the latter half of the 19th century. Of 1887 Palmer (1890: 252) wrote,

"Today, but for the Arctic Terns (which are useless for food and feathers) and the puffins (which are in most cases impossible to dig out), the island may be said to be deserted by birds. Only bones of the Great Auks, a few murre, still fewer razor-bills, and a few birds of other species [probably kittiwakes, gulls] are all that now breed on the island."

Because of gross overexploitation, seabird populations were in poor shape all along the coasts of northeastern North America at this time (Drury, 1973; Nisbet, 1973; see, also, Ainley and Lewis, 1974). However, even negative events sometimes have had positive consequences. The Great Auk's decimation provided a nesting substrate for puffins, another frequently threatened seabird (e.g., Lid, 1981; Kress, 1982). Owing to legislative protection during the 20th century, including the establishment of Funk Island as a Provincial Seabird Sanctuary in 1964, vacated colonies have been re-established (gannet), extant colonies have grown tremendously (Common Murres), and five new breeders have arrived (fulmars, two species of *Larus* gulls, kit-

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tiwakes, and Thick-billed Murres). At present nine marine species breed on Funk Island, probably the highest diversity ever. All populations are stable or increasing.

Funk Island's relative inaccessibility is a powerful deterrent to most terrestrial and aerial predators. Seven of the nine breeding seabirds typically nest on cliffs or steep grassy slopes, whereas on Funk Island five of these species breed on level terrain. While well-protected from most predators, the Funk Island seabird community, like other Newfoundland colony sites, remains highly vulnerable to human activities, including disturbance, oil spills, toxic pollutants, and potential competition with commercial fisheries for food supplies. These problems are discussed below (p. 182).

WADHAM, PENGUIN, AND CABOT ISLANDS

Located southeast of Fogo Island at the entrance to Hamilton Sound, the Wadham archipelago is made up of seven islands: Copper, Duck, White, Peckford, Coleman (or Green), Small (or James), and Offer Wadham. The Wadhams first appeared on a Newfoundland chart by Captain James Cook in 1763 (Seary, 1971). Coleman and Small Islands, the primary seabird sites, are small, low-lying grassy areas. North and South Penguin Islands lie to the south, just off the coast known as the Straight Shore. These low-lying islands are sandy and grassy, and a small spruce-fir forest grows on South Penguin. The Cabots, referred to as the Stinking Islands during the 16th to 18th centuries (Fig. 2; Seary, 1971), are located near Cape Freels at the mouth of Bonavista Bay. There is a lighthouse on North Cabot Island and only petrels breed there; South Cabot is a low, smooth rock outcrop with little vegetation. Little is known of the seabird histories of any of these islands. The Wadhams were probably important breeding areas for eider ducks in previous centuries. Some historians, such as Anspach (1819), and naturalists, such as Stuwitz (*in* Steenstrup, 1855), said that the Penguin Islands were former breeding grounds of the Great Auk. Their flat topographies would have made them easily accessible to flightless auks.

Leach's Storm-Petrel.—Petrels were reported nesting on the Penguin Islands in 1887 (Lucas, 1890). Peters and Burleigh (1951b) estimated that 900 pairs nested on South Penguin in 1945. In the same year they recorded that Small Island was "honeycombed" with petrel and puffin burrows, and estimated 3,000 breeding pairs of petrels in two colonies on the Wadhams (Peters and Burleigh, 1951b, unpubl. field notes). About 9,000 and 10,000 pairs of petrels are reported to breed today on the Penguin and Wadham Islands, respectively; some also nest on the Cabot Islands (Nettleship, 1980). Although a comparison of early and recent estimates makes it appear as if petrel populations have grown substantially, it must be emphasized that these nocturnal, burrow-nesting birds are very difficult to census; all figures, especially early ones, are simply crude guesses.

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Larus Gulls.—Herring (ca. 450 pairs), Great Black-backed (ca. 15 pairs), and Ring-billed Gulls nest on the Penguin Islands (Cairns, et al., 1986). Herring and Great Black-backed Gulls have increased recently on Small Island where there were at least 400 breeding pairs, mostly of the latter species, in 1984 (R. Elliot, pers. comm.). Peters and Burleigh (1949, 1951b) found eight Ring-billed Gull nests with eggs on South Penguin in 1945; about 75 pairs were nesting there in 1986 (Cairns, et al., 1986). The Ring-billed Gulls are the most abundant and nested in a large colony of approximately 550 pairs in 1984 on North Penguin Island (Cairns, et al., 1986). Although their numbers have been rapidly increasing during the past few decades, Ring-billed Gulls do not breed in any of the other major seabird colonies in Newfoundland.

Terns.—Approximately 100 pairs of Common and 50 pairs of Arctic Terns are estimated to nest on North Penguin Island, and about 250 terns (spp?) nest on South Cabot Island (Cairns, et al., 1986). In 1945 Peters and Burleigh (1951b) estimated 800, 200, and 125 pairs of Arctic Terns as nesting on South Penguin, South Cabot, and Small Island, respectively. The latter colony disappeared by the late 1970's, when the gull population increased substantially (R. Elliot, pers. comm.). Twenty-eight pairs of Caspian Terns nested on North Penguin Island in 1986 (Cairns, et al., 1986).

Razorbills.—In 1945 Peters and Burleigh (1951b) estimated 25 breeding pairs on South Cabot Island; about the same number are reported to nest today (Nettleship, 1980). A small colony on Small Island, noted by Tuck in the 1960s (unpubl. data), had approximately 20 pairs in 1984 and about 10 pairs nest on Coleman Island (Cairns, et al., 1986).

Black Guillemots.—In 1945 Peters and Burleigh (unpubl. field notes) recorded four guillemots on Coleman Island and none nesting on South Cabot Island. About 25 pairs now nest on Coleman Island; some also nest on Pigeon Rock west of Peckford Island (Cairns, et al., 1986).

Common Murres.—Peters and Burleigh (unpubl. field notes) recorded 150 adult and subadult Common Murres resting but not nesting on South Penguin Island in 1945. No murres nest on South Penguin Island today. Peters and Burleigh also estimated 100 pairs on South Cabot Island, where L. M. Tuck (1961) reported a small colony of less than 150 pairs. In 1973 about 2,000 pairs nested on South Cabot (Brown, et al., 1975), and the most recent figure is 2,600 pairs (Cairns, et al., 1986). The murres of South Cabot Island, like those on Funk Island, also breed on flat terrain.

Atlantic Puffins.—Lucas (1890) reported a few puffins nesting on the Penguin Islands in 1887. In 1940 Templeman (1945) found about 100 puffins on and around South Cabot Island, several hundred on Coleman Island, and 35 birds near Peckford and White Islands. In 1945 Peters and Burleigh (1951b, unpubl. field notes) estimated about 2,000 pairs on Small Island, which was "honeycombed" with puffin and storm-petrel burrows, and ap-

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proximately 500 pairs on Coleman Island, 200 pairs on South Penguin Island, and 50 pairs on South Cabot. In 1973 there were estimated to be 5,600 pairs and $\pm 3,000$ pairs nesting on Small and Coleman Islands, respectively, and 1,200 pairs were estimated for South Penguin (Brown, et al., 1975). Today more than 16,000 pairs and 1,500 pairs nest on the Wadhams and on South Penguin Island, respectively. About 20 pairs breed on South Cabot Island (Cairns, et al, 1986).

Common Eiders.—Several adult Common Eiders and broods were observed off the Penguin Islands in 1984 and 1986, and ten pairs are considered to nest on South Penguin Island (Cairns, et al., 1986).

BACCALIEU ISLAND

Situated off the northeastern tip of the Avalon Peninsula on Newfoundland's east coast, Baccalieu (approximately 6×1 km) is the largest major seabird island in Newfoundland and Labrador (Fig. 32); all others are dwarfed by comparison. As an apparent result of Cortereal's explorations, *Y. dos Bacalhas* appears along with Funk Island on Rinel's chart (ca. 1503). Bacalhas is derived from the Basque word for codfish. It is indicative of the Basques' fishing interests in the New World and of the exceptional cod fishery in the area. Some of Caboto's accounts referred to Newfoundland as Baccalhaos, and thus focused early attention on the island. There is also a Bacalhao Island near New World Island in Notre Dame Bay and another just north of Groswater Bay, Labrador.

Baccalieu Island has long been a favored spot of eggers and bird hunters (e.g., Anspach, 1819). The colonies here, like those on Funk Island, are very old; John Guy made reference to Baccalieu's seabirds in 1611. The local name "Baccalieu Birds" has been applied to the multitudes of puffins that raft in huge offshore flocks near the island. Such flocks were often used by mariners sailing to the New World as reliable landfall indicators, especially in the fog. Since 1858 a manned lighthouse has been maintained on the island, and until recently fishermen resided on the northern end each spring and summer (Noonan, 1979). Extended human habitation and intense fishing activity has led to the evolution of an elaborate complex of island place-names (Fig. 33).

Baccalieu Island provides varied nesting habitat and supports an impressive diversity of seabird (and landbird) species (Wells and Montevecchi, 1984). There are ocean-facing cliffs (up to 100 m above sea level on the eastern side), large talus slopes, steep and gradual grassy slopes, grassy meadows, barrens, freshwater ponds, small bogs, tuckamoor, and large stands of Balsam Fir. Eleven seabird species breed on Baccalieu today, the greatest diversity at any site in Newfoundland and Labrador.

Although an important seabird nesting area for many centuries, little is known about the history of seabirds on Baccalieu Island. The first ornithological account of Baccalieu appeared in 1942, when Peters made a day's



FIG. 32. Aerial view of Baccalieu Island (photo: Energy, Mines & Resources Canada).

visit and documented the existence of the gannet colony. He also made some "guesstimates" of seabird breeding populations, but as it is impossible to survey the marine bird habitat during a single day, Peters's numbers must be viewed with caution. Here we summarize all existing information on the seabird populations of Baccalieu Island.

Northern Fulmar.—These birds were first observed by lightkeepers in 1959. C. Bishop sighted them in 1968, and G. Baine (pers. comm.) counted 14 birds on the island in 1976. Their nesting was confirmed a year later, when

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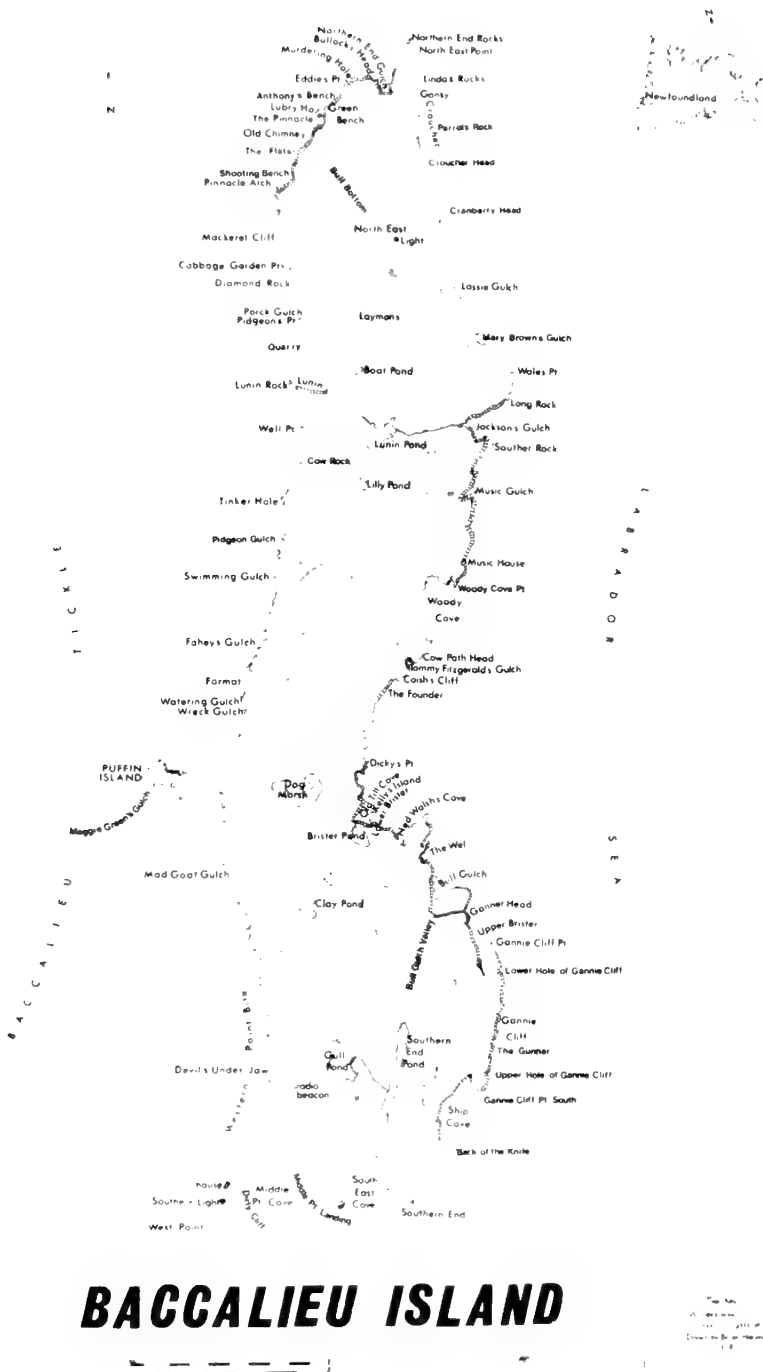


FIG. 33. Place names of Baccalieu Island (map by B. Harvey).

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two definite and three possible nesting pairs, and at least four pairs of prospecting birds were recorded (Montevecchi, et al., 1978). In 1983, 63 fulmars were counted by A. E. Burger, J. Wells and Montevecchi, and it was estimated that about 20 pairs were breeding.

Leach's Storm-Petrel.—The breeding population of petrels is massive; it has recently been estimated to be approximately 3,360,000 pairs (Sklepkovych, 1986). The colony, which has been on Baccalieu since before the turn of the century, as indicated by a specimen collected by Sornborger in 1897, is probably the largest in the world. Roger Tory Peterson had a similar impression, when he visited Baccalieu Island in 1959.

Petrels burrow in the peaty soil of grass meadows and wooded sections over the entire island. The densest nesting concentrations are on the eastern side in the valleys and grassy slopes south of Souther End Pond, near Gannie Cliff and in the meadows at Ned Walsh's Cove (Fig. 33).

The petrels are the primary prey of a small population of Red Foxes that have inhabited the island for some time (Maccarone and Montevecchi, 1981; Sklepkovych, 1986). The first record of foxes on Baccalieu Island was in 1914, when a local resident sought permission from the Game and Inland Fisheries Board to trap them. Red Foxes were seen crossing the pack ice between the island and the mainland by lightkeepers in 1959 (P. Rice, pers. comm.).

The foxes also eat puffins, though their deeper burrows, often in boulder scree, make them less vulnerable than the petrels. Some foxes may specialize on puffins; some of their caches have contained more than 50% of this prey (Maccarone and Montevecchi, 1981). In general, few adult cliff-nesting seabirds are preyed on, although early in the season foxes do capture some kittiwakes and gannets that land atop the island (Sklepkovych, 1986). The foxes also take eggs and chicks from cliffs. One fox removed 16 Common Murre eggs from a steep cliff face in 90 minutes (Maccarone and Montevecchi, 1981).

The largest fox cache found on Baccalieu Island contained 190 birds (181 petrels, three puffins, three kittiwakes, a Common Murre, and a Fox Sparrow). Hoarding large quantities of food in a single location is unusual behavior for Red Foxes. They usually tend to hide one or a few food items at a single location (MacDonald, 1976). The Red Fox's northern relative, the Arctic Fox makes large multiple-prey stores, an apparent adaptation to see them through harsh winters. On Baccalieu Island food scarcity probably necessitates similar hoarding by Red Foxes, as in winter they have been observed eating cones off spruce trees (Sklepkovych, 1987)!

The foxes' effects on petrels and puffins need to be carefully studied, but we do know that their influences are not entirely negative. Foxes deter ground-nesting Herring and Great Black-backed Gulls from breeding on Baccalieu Island. These birds are major predators of burrow-nesters on other islands (e.g., Witless Bay islands). Preliminary calculations indicate that the current

fox population on Baccalieu has less of an impact on the petrels than would a colony of a few hundred pairs of *Larus* gulls. In the absence of Red Foxes, Baccalieu would support gull colonies of many thousands and possibly tens of thousands pairs.

Northern Gannet.—The gannetry on Baccalieu Island is distributed over three vertical cliffs (50–75 m high) at Gannet Head on the eastern side of the island (Fig. 34). Peters (1942) estimated 200 pairs in 1941 and was informed by a local resident that gannets had been nesting there for about 40 years. In view of Lucas's report (1890) of sighting no gannets on an east coast cruise from St. John's to Funk Island, Templeman (1945) conjectured that the colony may have been deserted at that time. Templeman's sources led him to believe that gannets may have nested on Baccalieu Island since at least 1850, and perhaps centuries earlier. It is likely that Lucas passed on the inside of the island, and if so might have missed seeing gannets that nest on the outer (eastern) cliffs.

Aerial photographic counts yielded an estimate of 673 site holding pairs (Nettleship, 1976). Four ground counts carried out by Montevicchi, I. Kirkham, and J. Wells in 1976–78 and 1982 averaged 465 nesting pairs (range = 441–481) with an average of 562 site holding pairs (range = 525–600). The high aerial estimate is probably due to errors associated with photographing vertically distributed cliff-nesting seabird colonies (see, also, Montevicchi, et al., 1980, 1987).

The colony may have been larger in the 1950s, when gannets are known to have nested on the grassy plateau above the cliffs (D. Huxter, pers. comm.). This nesting area was devastated in the early 1960s when some members of a work crew killed many of the birds nesting above the cliffs (P. Rice, pers. comm.). Foxes may have deterred re-expansion onto the plateau in recent years.

Herring and Great Black-backed Gulls.—Very few nest on Baccalieu. About 150 pairs of Herring Gulls and seven pairs of Great Black-backed Gulls breed on Puffin Island just off Baccalieu's western shore (Cairns, et al., 1987).

Black-legged Kittiwake.—Major colonies are on the eastern cliffs at Upper Brister/Gannet Head, Bull Gulch, Old Tilt Cove, and Lower Brister. In 1941 Peters (1942) estimated that 12,500 pairs inhabited Baccalieu Island; in 1983 J. Wells counted 12,975 pairs.

Common Murre.—Common and Thick-billed Murres, Razorbills, and puffins are referred to as "Baccalieu Birds" in old accounts (Anspach, 1819), suggesting that they have been abundant on the island for some centuries. The alcids and kittiwakes were the target species of egggers who until recent times made annual spring collecting trips to the island. Murres share nesting cliffs with kittiwakes, and the largest concentrations are found at Upper Brister, Old Tilt Cove, and Lower Brister. Wynne-Edwards estimated 500–1,500 pairs



FIG. 34. Gannet colony of Baccalieu Island is distributed over the three cliff faces of Gannet Head. Faces 1 and 3 were counted from the point of land marked with an X; face 2 was counted from the photographer's position (photo: WAM).

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in 1934 (Johnson, 1940; Templeman, 1945), and this compares with Peters' (1942) 5,000 pairs in 1941 and R. T. Peterson's 2,500 pairs in 1959 (L. M. Tuck, 1961). Nettleship (1980) reported $\pm 1,500$ pairs of Common Murres for Baccalieu Island. In 1981 J. Wells counted 3,526 pairs, though not all areas could be fully counted and we estimate that about 4,000 pairs nest on Baccalieu at present.

Thick-billed Murre.—A few pairs are scattered among the Common Murres, with most at The Well and Upper Brister. L. M. Tuck (1961) reported their presence and speculated that Thick-billed Murres comprised at least 20% of the murre population on Baccalieu Island. In 1981 J. Wells counted 181 pairs and in view of this most recent count it seems that Tuck may have overestimated their relative abundance.

Razorbill.—These crevice-nesters are difficult to census. No systematic counts have been made, although there appears to be a minimum of 100 pairs.

Black Guillemots.—Like Razorbills, these alcids nest in rock crevices, are difficult to census, and have not been systematically surveyed. Peters (1942) estimated 375 pairs. It is our impression that 100 or more pairs nest on Baccalieu Island. Nowhere on the island do they breed in assemblages that could be considered colonial.

Atlantic Puffin.—Baccalieu Island is the site of a large puffin colony, which according to the lightkeepers has increased substantially over the past two decades (E. Blundon and P. Rice, pers. comm.). Wynne-Edwards (unpubl. field notes) observed a few near the island in 1934. Peters (1942) estimated 2,500 pairs in 1941, and later Peters and Burleigh (1951b) reported 3,500 pairs. Nettleship presented estimates of $\pm 3,000$ pairs in 1969 and $\pm 10,000$ pairs more recently (Brown, et al., 1975; Nettleship, 1980).

The steep grassy and talus slopes and the cliffs around the island provide nesting habitat for puffins. The largest nesting concentrations are on the eastern and northern sides of the island, the densest being located at Woody Cove. The details of our estimate of the puffin population, approximately 30,000 nesting pairs, on Baccalieu Island are summarized in Table 14.

Baccalieu Island is the most important seabird community in Atlantic Canada today that is not protected by Provincial Seabird Sanctuary status. The island will, however, soon be given protection under the provincial Wilderness and Ecological Reserves. This legislation will facilitate protection from illegal disturbance and hunting, but the birds will remain vulnerable to environmental degradation, which can only be minimized by conscientious long-term planning.

WITLESS BAY ISLANDS

Gull, Great, and Green Islands comprise the Witless Bay Provincial Seabird Sanctuary that lies just south of Bay Bulls and north of Calvert (for-

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TABLE 14. Estimates of the breeding population (pairs) of Atlantic Puffins on Baccalieu Island.

NESTING SITES ^a	NESTING AREA (m ²) ^b	ESTIMATED OCCUPIED BURROWS/m ^{2c}	ESTIMATED PAIRS ^d	OBSERVER ESTIMATES ^e	TOTAL PAIRS
Croucher	66,505	0.2	13,301		13,301
Bullock's Head to The Flats	25,530	0.2	5,106		5,106
Dicky's Point to Coish's Cliff	27,558	0.1	2,756		2,756
Woody Cove	9,250	0.55	5,088	190	5,278
Lassie Gulch	5,039	0.2	1,008	100	1,108
Blueberry Hole to Lunin				500	500
Ship Cove				500	500
Middle Cove				250	250
Norther End Gulch				200	200
Middle Cove to Fog Alarm				100	100
Above Gannet Head				100	100
Upper Brister				100	100
Jackson's Gulch				75	75
Total breeding pairs					29,374

^aSee Figure 24 for site locations.

^bPuffin nesting areas measured on ground.

^cFour study plots were set up in Woody Cove in 1977 and 1983 by W. A. Montevvecchi, I. R. Kirkham, B. Harvey, R. Purchase, B. Sklepko, and J. Wells. The lowest estimate of burrow density (1.46 burrows/m²) × an occupancy estimate of 37.7% (range: 35.1 – 39.3%) yielded an occupied burrow density of 0.55 burrows/m² for Woody Cove. For other areas judged to be very thickly settled on the basis of boat surveys, occupancy estimates of 0.2 burrows/m² were used, and an estimate of 0.1 burrows/m² was used for nesting areas from Dicky's Point to Coish's Cliff.

^dEstimated pairs = estimated nesting area × estimated occupied burrow density.

^ePairs were estimated by two observers at sites where densities were low and nesting areas were not measured.

merly Caplin Bay, an English place name that superceded the Portuguese *R. das patas*, i.e., goose or auk river; Seary, 1971). According to Seary (1971), Yonge in 1664 was the first to use the name Witless Bay, which may have been derived from the Newfoundland surname Whittle. It may have also stemmed from the West Country English word "whittles" used to refer to locally predominant shrubs, or as a metaphor about the "witless" or crazy seas in the bay.

Seary (1971) suggests that Great Island corresponded to the island the Portuguese called *Y. de los patas* (Santa Cruz, 1545, in Seary 1971) and that formerly was referred to as Goose Island. In 1671 John Seller produced "A Chart of the Coast of America from New found land to Cape Cod," which depicted Gull, Goose, and Great(?) Islands near Bay Bulls (Seary, 1971). Captain James Cook referred to Great Island on a chart in 1762 (see, also, Fig. 2).

Gull is the largest (1.6×0.8 km) of the Witless Bay Islands and has an extensive fir/spruce forest. Great Island (1.4×0.8 km) has rocky cliffs that attain a maximum height of more than 80 m and also supports a limited forest. Dome-shaped Green Island (0.5×0.25 km) has steep cliffs up to about 50 m above sea level about its perimeter; it is the least accessible to humans of the Witless Bay islands. In 1942 Peters and Burleigh (1951b, unpubl. field notes) carried out the first avifaunal survey of Witless Bay and landed on Gull and Green Islands, but did not mention Great Island. In 1950 Tuck made the initial ornithological visit to Great Island.

Northern Fulmar.—In 1973 Montgomerie found six breeding pairs of fulmars on Great Island, the first breeding record for the province (Nettleship and Montgomerie, 1974). Fulmars have since been found nesting on Funk Island (p. 152) and Baccalieu Island (p. 162). In 1983 17 pairs nested on Great Island (W. Lidster, pers. comm.).

Leach's Storm-Petrel.—Based on brief visits in 1942, Peters and Burleigh (1951b) estimated 200 and 500 pairs of Storm-Petrels on Green and Gull Islands, respectively. These figures are certainly underestimates, being based on daytime visits to the colonies. Using burrow density calculations and the occupied area on Gull Island, Huntington (1963) estimated 400,000 pairs in 1960, and Haycock (1973) estimated 500,000 pairs in 1969. An apparent underestimation of 210,000 pairs on Gull Island was made in 1973 (Brown, et al., 1975). Recent estimates for Gull and Great Islands are 530,000 and 250,000 pairs, respectively (Nettleship, 1980). Some, probably most, of the variation in estimates is a function of the difficulties involved in censusing these burrow-nesters. Fewer than 200 pairs may nest on Green Island today (Nettleship, 1980).

Herring and Great Black-backed Gulls.—As the name suggests, Gull Island has long been a larid nesting area. Peters and Burleigh (unpubl. field notes) estimated 500 pairs of Herring Gulls and 12 Great Black-backed Gulls there

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in 1942. In 1950 L. M. Tuck found no gull nests on Great Island, but in 1958 found 128 Herring Gull nests there.

The *Larus* gull population in Witless Bay has increased substantially in the past three to four decades. Increases in refuse and decreases in human disturbance, including the harvesting of eggs, chicks, and adults, are probably the main causes of this population trend (see, also, Drury, 1973). From 1968 to 1972 estimates of Herring Gull nests on Gull Island ranged from about 1,500 to 2,663 (Haycock, 1973; Threlfall, 1978). In 1970 and 1971 Haycock (1973) estimated that there were 36 and 40 Great Black-backed Gull nests on Gull Island. Threlfall estimated that there were 5,400 pairs of Herring Gulls and 125–150 Great Black-backed Gulls breeding on the Witless Bay Islands in 1970. Most recent estimates (Nettleship, 1980) indicate that the Herring Gull population is about fifty percent higher than, and the Great Black-backed Gull population about double the respective 1970 estimates (see Table 15).

L. M. Tuck first banded Herring Gulls on Gull Island in 1955, and from 1966 to 1972 Threlfall (1978) and his students banded 12,785 birds. Threlfall's analysis of the recovery data showed that first-year birds tend to disperse northward from Gull Island in late summer and fall but by winter were recovered primarily along the New York and New Jersey coastlines. Adults did not in general migrate as far as younger individuals, and were recovered from Massachusetts to New Jersey in winter. Threlfall suggested that the northerly movement of juveniles might be associated with the later inshore spawning of capelin in northern Newfoundland and southern Labrador. A similar post-breeding dispersal of young and adult Common Murres may also be related to inshore capelin spawning (L. M. Tuck, 1961). Much of the winter population of gulls in Newfoundland consists of birds that have migrated from the Great Lakes region (Threlfall, 1978).

Black-legged Kittiwake.—Peters and Burleigh (1951b) estimated 2,500 and 500 pairs of kittiwakes on Green and Gull Islands in 1942. Substantial colony growth at Gull Island occurred over the next three decades, as indicated by Maunder and Threlfall's (1972) counts in 1969 and 1970 (Table 15). Haycock (1973) used photographic techniques to estimate a breeding population on Gull Island of 10,140 pairs in 1971. The most recent estimates for Great and Green Islands are 23,229 pairs (1968) and about 10,000 pairs (1973), respectively (Brown, et al., 1975).

Razorbill.—These birds were first found nesting on Green Island in 1942 by Peters and Burleigh (1951b), who estimated that there were 100 nesting pairs. Razorbills have remained at low abundance. L. M. Tuck found no Razorbills on either Great or Gull Island in 1950, and in 1959 he estimated a few nesting pairs on Gull Island. In 1969–71 Haycock (1973) estimated 40 pairs of Razorbills on Gull Island and in 1983 J. E. Maunder estimated 60 pairs. Montgomerie estimated 120 and 170 pairs on Great and Green Islands in 1973 (Brown, et al., 1975).

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Common Murre.—Murre populations have increased in recent decades on all islands, but especially on Green Island, where the bulk of the population breeds, (L. M. Tuck, 1967a). Peters and Burleigh (1951b) estimated 3,000 and 50 pairs on Green and Gull Islands in 1942. According to local residents, the birds settled on Green Island about 1936 (L. M. Tuck, 1961). Up to 1960 Tuck found only nonbreeding murres on Gull Island, suggesting that Peters and Burleigh (1951b) may have also observed nonbreeders there. The Gull Island population consisted of only four or five pairs in 1962; from 1969 to 1971 Haycock (1973) estimated that the population increased from 136 to 316 pairs. From 1973 through 1978 about 600 to 700 pairs nested on Gull Island (Table 15). In 1973 Montgomerie estimated 2,800 pairs on Great Island (Brown, et al., 1975). There is evidence for rapid population growth on Green Island, for which estimates of the number of pairs have been 10,000 (1951), 20,000 (1953), 50,000 (1959), and 74,000 (1973) (L. M. Tuck, 1961; Montgomerie, in Brown, et al., 1975).

Thick-billed Murre.—In 1942 Peters and Burleigh (unpubl. field notes) collected a subadult on Green Island, but made no mention of nesting birds. In the late 1950s L. M. Tuck (1961) estimated 1,500 pairs on Green Island, whereas Montgomerie estimated 600 pairs in 1973 (Brown, et al., 1975).

Black Guillemot.—Following a survey of Witless Bay, Peters and Burleigh (unpubl. field notes) estimated 1,500 nesting pairs in the vicinity of Gull and Green Islands and of the Bay Bulls shoreline in 1942. This figure is high by today's impressions (J. Piatt, pers. comm.); in 1970 Haycock (1973) estimated 10–20 pairs on Gull Island.

Atlantic Puffin.—These birds have been known to nest on Green Island from the 19th century (L. M. Tuck, 1961), though they were reportedly first seen by local fisherman on Gull Island in the 1930s (W. Threlfall, pers. comm.). Like the murres, the puffins' population has increased dramatically in recent decades (L. M. Tuck, 1967a). Peters and Burleigh reported 5,000 and 1,000 pairs on Green and Gull Islands in 1942, and Templeman (1945) was informed of their "breeding in numbers" on Great Island. In 1973 there were estimated to be 148,000, 60,000, and 17,000 pairs on Great, Gull, and Green Islands, respectively (Brown, et al., 1975).

Other seabirds.—Tuck observed gannets roosting on Green Island during the summers of 1952 and 1953 and thought that they were prospecting for nesting sites. They have not been reported there since, although gannets, possibly from Baccalieu Island, are commonly seen flying off Witless Bay.

CAPE ST. MARY'S

Located on the southwestern tip of the Avalon Peninsula, Cape St. Mary's is one of the most spectacular seabird nesting areas in the world. The marine bird breeding community extends along the 100–125 m high cliffs for more

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TABLE 15. Summary of the breeding population estimates for the Witless Bay Islands¹

YEAR	ISLAND	NORTHERN FULMAR	LEACH'S STORM- PETREL	HERRING GULL	GREAT BLACK- BACKED GULL	BLACK- LEGGED KITTIWAKE	RAZORBILL	COMMON MURRE	THICK- BILLED MURRE	BLACK QUILLEMOT	ATLANTIC PUFFIN	SOURCES ²
1942	Green Gull		200 500	500	12	2,500 500	100 0	3,000 50		100 +	5,000 1,000	1
1944	Great						+					2
1950	Great			0	0		0	0			5,000	3
1951	Green Gull			40 76	0 0	2,000		10,000 0				3
1953	Green							20,000				3
1958	Great			128								3
1959	Green Gull						10	50,000	1,500			3
1960	Gull		400,000				0					3,4
1962	Gull						0	5				3
1968	Great Gull			1,983		23,229						5,6,7
1969	Gull		500,000	2,033		6,977	40	136			100,000	5,6,7

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1970	Gull			2,544	36	8,306	47	260		10-20		5,6,7
1971	Gull			2,539	40	10,140		316				5,6,7
1972	Gull			2,663								5,6
1973	Great Green Gull	6	170,000 210,000			23,229 10,000	120 170 30	2,800 74,000	600	148,000 17,000 60,000		8,9
1977	Gull							589				10
1978	Gull							687				10
1979	Great Green Gull		250,000 + 530,000	2,700 300 3,850	80 50 120					+	+	10,11
1983	Great Gull	17					60					12 13
1984	Gull				113							14
Current	Great Green Gull	17	250,000 + 530,000	2,700 300 3,850	80 50 113	23,229 10,000 10,140	120 170 60	2,800 74,000 687	600	+	+	148,000 17,000 60,000

¹All numbers refer to pairs. + means present.

²(1) Peters and Burleigh, 1951b, unpubl.; (2) Templeman, 1945; (3) L. M. Tuck, 1961, unpubl.; (4) Huntington, 1963; (5) Haycock, 1973; unpubl.; (6) Threlfall, 1978; (7) Maunder and Threlfall, 1972; (8) Brown, et al., 1975; (9) Nettleship and Montgomery, 1974; (10) Mahoney, 1980; (11) Nettleship, 1980; (12) Lidster, pers. comm.; (13) J. Maunder, pers. comm.; (14) N. Roy, pers. comm.

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than 5 km. The most striking aspect of the Cape St. Mary's Provincial Seabird Sanctuary is Bird Rock, a huge sea stack that is covered with a brilliant white frosting of nesting gannets from April through October.

The sheer mainland cliffs adjacent to the stack provide breeding sites for tens of thousands of kittiwakes and murres. Razorbills, Black Guillemots, and Herring and Great Black-backed Gulls also nest there.

In 1529 Ribeiro, a Portuguese cartographer, depicted on a map of Newfoundland *C. de St. Iago* (Cape St. James) in the location of Cape St. Mary's. This placename was superseded shortly thereafter by the Portuguese *Cabo de Sancta Maria* and the French *cap de Sainte Maria* (Oviedo, 1536 and Alphonse, 1544, in Seary, 1971). Little is known about the early history of the cape's seabirds, though there is considerable documentation from the latter part of the 19th century.

Gannet colony.—The gannetry on Bird Rock is the southernmost one in the world today. Gannets were first noted nesting on the stack in the late 1870s, and by 1883 there were at least 10 breeding pairs (Wynne-Edwards, 1935b). J. C. Cahoon climbed the stack in 1889 and noted many gannets and Common Murres nesting. Bigelow (1890) wrote that Bird Rock was covered with gannets and murres, each occupying separate areas on the plateau. English (1918) reported "thousands" of gannets at the Cape.

In 1934 Wynne-Edwards (1935b) made the first rough count of the gannets (4,000 to 4,500 pairs). In view of Bigelow's (1890) report that gannets were nesting on the plateau, it is notable that Wynne-Edwards observed none there. Common Murres, that were reported to have formerly occupied the entire upper half of the stack during the 19th century, covered the plateau in 1934. In 1939 Davies and Keynes (1948), visiting with the English Public Schools' Exploring Society, counted $4,394 \pm 369$ pairs of gannets, which were reported to be expanding onto the plateau and displacing the murres. Soon after the gannetry completely covered the stack. In 1942 Peters and Burleigh (1951b) estimated 5,000 pairs of gannets breeding on Bird Rock, a figure with which the most recent counts concur (Nettleship, 1976; Montevocchi, et al., 1980). In the mid-1960s Bird Rock became accessible by road and also became a target for vandals. By the late 1960s few gannets nested atop the rock because of disturbance (shooting, rock and beer bottle throwing) (W. Threlfall, pers. comm.). As the result of a brief prepared for the Natural History Society of Newfoundland and Labrador by Threlfall and Tuck, the provincial wildlife division began enforcement of wildlife regulations in the area, and only then did the gannets again nest on the plateau (W. Threlfall and D. Steele, pers. comm.). At present very few murres occupy Bird Rock, though more than 10,000 breed on adjacent cliffs (Nettleship, 1980).

According to Nelson (1978), who presumably obtained Wynne-Edward's second-hand information, gannets were first noticed on mainland areas adjacent to the stack in the late 1920s. Nesting attempts on the mainland east

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of the stack were made in 1931–34 (Wynne-Edwards, 1935b). However, up until at least 1939 nests there were reportedly destroyed by fishermen (Nelson, 1978), who apparently thought that gannets were serious competitors of fish and murrens (via nest site competition), both staples in the local food economy. Predators, including Red Foxes and Short-tailed Weasels, may have also prevented successful nesting on the mainland. In 1934 Wynne-Edwards (1935b) estimated 500–700 birds roosting on the adjacent mainland west of Bird Rock, but found no nests. In 1959 Tuck and Fisher (unpub. data) counted between 400 and 500 gannets loafing on the headland east of Bird Rock and another 61 birds on the mainland west of the stack; they searched these areas but found no nests. In 1972 nesting attempts were noted on the mainland east of Bird Rock, and two “old” chicks were seen on nests (W. Threlfall, pers. comm.). On 2 October 1977 Montevecchi banded an eight-week old chick in a mainland nest east of Bird Rock.

On 25–26 September 1982 (and 1983), during the peak gannet fledgling period, Montevecchi and Wells (1984b) observed two chicks in fledgling plumage and six adults on the mainland cliffs approximately 150 m west of Bird Rock. They counted 48 chicks (43 in 1983) on the eastern headland (Fig. 35). Two-thirds of the mainland nestlings were of fledging age (13 weeks posthatch), and most certainly fledged successfully. It is likely that some young had departed from the mainland before we discovered them (approximately 30–40% had fledged from the stack by this time) and that we missed some chicks in our count. Assuming 80–90% hatching and fledging success (Nelson, 1978; Montevecchi, unpubl. data), 50 or more pairs may have nested on the mainland in both years, and there could have been many more failed nesting attempts. About 30% of the mainland females laid later than females on the stack. This may be attributable in part to a disproportionate number of young breeders in the recently occupied mainland nesting areas, a finding to be expected in an expanding colony (Nelson, 1978). The satellite colony continued to expand in 1984, and about 125 chicks were raised to fledging age on the mainland. In 1986, 266 active nests were counted (Montevecchi, unpubl. data).

Gannetries are biologically stable entities, and new ones are rarely established (Brun, 1974; Nelson, 1978; Barrett, 1979). Once a new area is occupied, however, the number of breeders can increase very rapidly owing to immigration into the colony (e.g., Funk Island). The mainland nesting expansion at Cape St. Mary's opens the possibility of a large population increase.

Other seabirds.—Cape St. Mary's is the southernmost major breeding site for Common Murres in the western North Atlantic, and the most southerly breeding area for Thick-billed Murres in the world (L. M. Tuck, 1961). Both species were breeding and were collected at the cape by Cahoon in about 1890. In 1934 Wynne-Edwards estimated that there were 5,000 pairs of Common Murres, whereas in 1942 Peters and Burleigh (1951b) estimated

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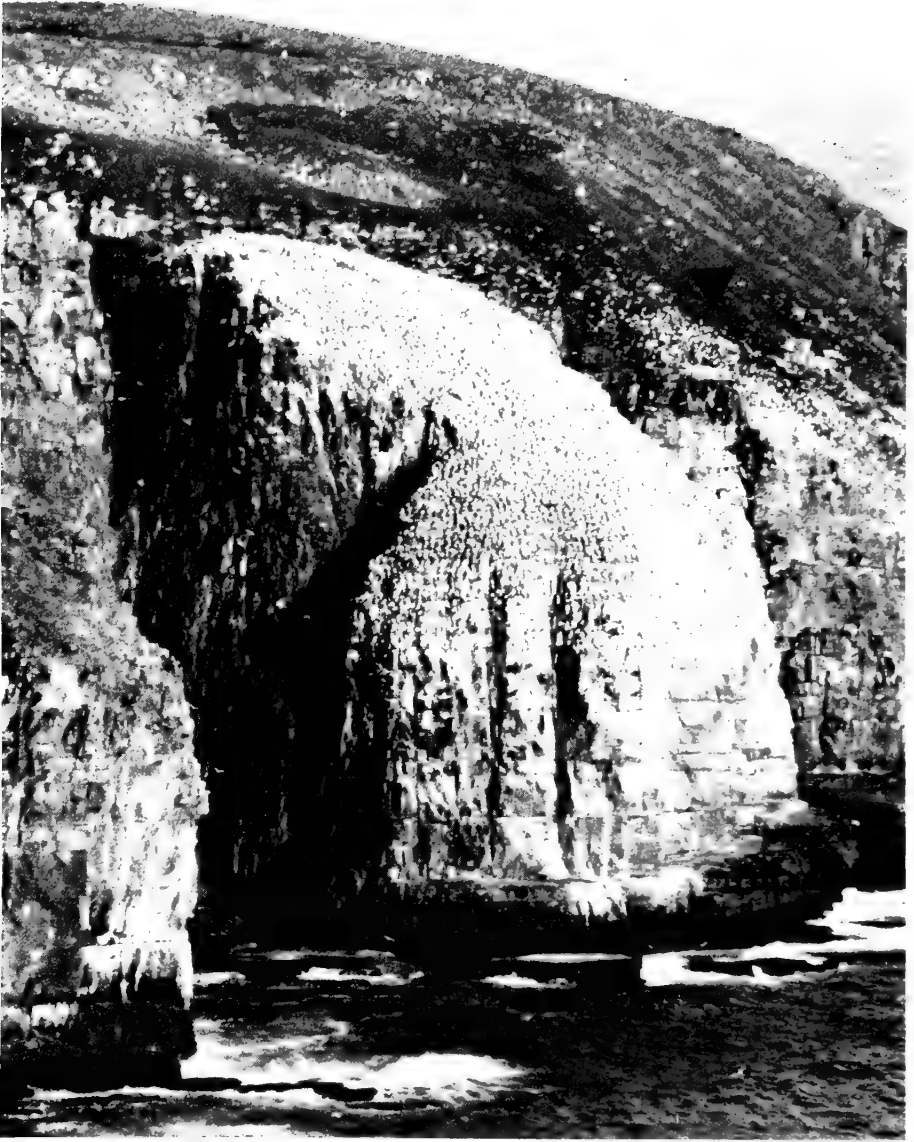


FIG. 35. Mainland expansion of the gannet colony at Cape St. Mary's. Arrow indicates major mainland nesting site. (Photo: WAM.)

2,500 pairs. L. M. Tuck and J. Fisher considered that there were 2,500 pairs of Common Murres and 285 pairs of Thick-billed Murres breeding in 1959 (L. M. Tuck, 1961). Murres have apparently increased in recent decades, as approximately 10,000 pairs of Common Murres and 1,000 pairs of Thick-

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TABLE 16. Nesting pairs of cormorants at Island Head, Placentia Bay.

DATE	NUMBERS OF NESTING PAIRS OF CORMORANTS		OBSERVERS
	GREAT	DOUBLE-CRESTED	
29 June 1977	>3	3	J. Wells, J. Piatt
28 June 1980	11	11	J. Wells
3 July 1981	15	9	J. Wells
10 July 1983	10	11	D. Morrow

billed Murres are now nesting at Cape St. Mary's, as are approximately 100 pairs of Razorbills (Nettleship, 1980). Wynne-Edwards (1935b) reported many Black Guillemots breeding, and Peters and Burleigh (unpubl. field notes) estimated 300–500 on a boat trip from St. Bride's to Bird Rock in 1942.

In 1934 Wynne-Edwards recorded "countless numbers" of kittiwakes on the cliffs between Cape St. Mary's and Bird Rock (Peters and Burleigh, unpubl. field notes), whereas in 1942 Peters and Burleigh (1951b) estimated 7,500 pairs. Today there are estimated to be about 10,000 nesting pairs of kittiwakes (Nettleship, 1980). Herring and Great Black-backed Gulls also nest.

Peters and Burleigh (1942, unpubl. field notes) reported a colony of 50–100 pairs of Double-crested Cormorants at Island Head, about 8 km north of the cape. A small mixed colony of Double-crested and Great Cormorants nests there today (Table 16). It is possible that Peters and Burleigh included roosting birds in their estimate or that the colony has decreased since 1942. Small colonies of Double-crested Cormorants were observed by A. R. Lock during aerial surveys in 1973 at Gull Cove (more than 20 pairs) and Red Cove (22 individuals) that lie east of Cape St. Mary's (Brown, et al., 1975). These colonies also may include both cormorant species (J. Wells, pers. comm.).

In 1986 another cormorant colony, containing six pairs of Great and one pair of Double-crested Cormorants, was found near Lear's Cove, a few kilometers north of the cape (J. Wells, pers. comm.).

Seaducks.—Marine waterfowl are a very important component of the marine avifauna in coastal Newfoundland waters, especially during winter. The Cape Shore and Cape St. Mary's areas are principle wintering sites for Common Eiders, Oldsquaws, and Harlequin Ducks, as well as for other seaducks and Thick-billed Murres, kittiwakes, and Dovekies (Goudie, 1981). The steep cliffs around Cape St. Mary's apparently protect the ducks from land-based hunters, and as food supplies (e.g., blue mussels) appear to be plentiful, the ducks often congregate in huge flocks along the coast. With the possible exception of Funk Island, all the major seabird breeding sites are important wintering areas for seaducks.

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CHANGES IN THE DIVERSITY OF SEABIRDS BREEDING IN NEWFOUNDLAND

Range retraction of Glaucous Gulls.—The only known extant seabird reported to nest previously in Newfoundland that no longer does so is the Glaucous Gull. In 1912 “six or seven” pairs of these gulls were reported on an inland lake near Bay St. George (Brown, 1912). Glaucous Gulls were also reported to nest in Sandy Lake and on cliffs along the west coast (Bent, 1921; Peters and Burleigh, 1951b). The birds are common in Newfoundland today, though none are known to nest, and there have been no nest reports since the early part of the present century. The Glaucous Gulls’ known breeding range now only extends as far south as about central Labrador (Lock, 1979). On the basis of the existing information it is not possible to gage the extent of the species’ former nesting range in Newfoundland, nor is it possible to assess why the species no longer nests here. Yet, the rather substantial northward retraction of the species’ breeding range in recent times is worthy of further scrutiny, and summer occurrences of these birds should be noted closely.

Recent seabird immigration.—Northern Fulmars are abundant holarctic seabirds that are among the most common pelagic seabirds in Newfoundland waters. Fisher (1952) considered the Grand Banks a “nursery” for young European fulmars. The band returns of fulmars recovered in Newfoundland indicate that the birds originated in the British Isles and western Greenland (L. M. Tuck, 1971), although fulmars have not been extensively banded in the Canadian Arctic and we do not yet know where these birds winter. All fulmars nesting in Newfoundland have light plumage, suggesting that they are most likely of western Greenland or European origin. Mostly dark-phased fulmars inhabit the Canadian Arctic, although many that nest there also have light plumage.

Within the past decade fulmars have been seen prospecting for nest sites off coastal Labrador (Nettleship and Lock, 1973) and have been documented breeding on three Newfoundland islands, viz., Funk, Baccalieu, and Great (Witless Bay) (Nettleship and Montgomerie, 1974; Montevicchi, et al., 1978). There is ample nesting habitat and at some sites, such as Baccalieu Island, many more fulmars have been observed prospecting than breeding. Assuming an adequate food supply, the number of Northern Fulmars nesting in Newfoundland is expected to increase.

The Manx Shearwater is another European immigrant that has recently begun to breed in Newfoundland. It was first recorded about 90 km off Cape Race on 24 June 1933 by Wynne-Edwards during one of his trans-Atlantic surveys. The first specimen was collected by S. M. Christian at St. Anthony on 24 May 1947. Reports and specimen collections of Manx Shearwaters in Newfoundland coastal waters during summer became much more frequent after 1950, and in time it became evident that young birds fledged from Skokholm Island in Wales were the source of many of the Newfoundland records (Table 17). Manx Shearwaters probably have been much more

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TABLE 17. Band recoveries of Manx Shearwaters in Newfoundland.

DATE RECOVERED	LOCALITY	BANDING SITE	BANDING DATE
30 June 1954	Bonavista Bay	Skokholm	26 Aug. 1952
10 July 1958	off Cape Spear	Skokholm	16 Aug. 1957
10 Aug. 1966	Bonavista Bay	Skokholm	30 Aug. 1965
20 Sept. 1967	off Fogo Island	Skokholm	22 Sept. 1966
27 Aug. 1969	Belleoram, Fortune Bay	Skokholm	9 Sept. 1968
2 July 1970	Lord's Cove, Placentia Bay	Skokholm	7 Sept. 1964
13 Nov. 1970	Twillingate	Skokholm	29 Aug. 1965
30 July 1976	Cape Broyle	Helmaey, Iceland	14 Sept. 1972
20 Aug. 1976	Lawn	Skomer	1971
20 Aug. 1976	Lumsden	Skokholm	1975
7 July 1977	Middle Lawn	Skokholm	1971

common than our records suggest. Familiarity with the species is indicated by the use of a local name "Skirwink" by fishermen in Bonavista Bay (C. Hall, pers. comm.).

In 1977 Lien and Grimmer (1978) documented the existence of the species' first North American colony on Middle Lawn Island, Placentia Bay. Birds captured in this colony have also been banded on Skokholm. Mark-recapture studies carried on at Middle Lawn Island by Storey and Lien (1985) from 1977 to 1981 indicate that the population of Manx Shearwaters has increased from about 220 birds in 1977 to about 360 in 1981. A significant proportion of these birds was nesting, though the vast majority of them were not breeding and were presumably prospecting for burrow sites. There is every indication that this colony will continue to grow and it is also anticipated that Manx Shearwaters will be found nesting on other islands in Newfoundland (J. Lien, pers. comm.). Many sightings of Manx Shearwaters on and around coastal islands have been made during summer. In 1987 birds were found prospecting on the French island of Columbier, near St. Pierre (S. Bryant, A. Debrosse, R. and R. Etcheberry, pers. comm.).

The Common Black-headed Gull, an Old World species, has fairly recently established a small, but seemingly permanent, reproductive foothold in northeastern North America. One of the earliest records of the species in eastern North America was from Stag Harbour, Labrador, where in September 1933 a black-headed gull that had been banded in Groote Meer, Holland on 21 June 1932 was recovered (L. M. Tuck 1971). On 26 October 1943 a bird that had been banded as a nestling in Iceland on 16 June of that year was collected in Badger, Newfoundland. The specimen was skinned by William Templeman (p. 137) and given to Harold Peters. The next black-headed gull record for Newfoundland came on 10 March 1948, when a bird was shot at Random Island by G. Langor. This gull too had been banded

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as a nestling in Iceland during the previous nesting season (23 June 1947; Peters and Burleigh, unpubl. field notes). On 2 May 1953 Tuck sighted five immatures in Chapel Arm in Trinity Bay, and in the winter of 1954, he saw ten black-headed gulls in the same location. In the spring of 1955 Tuck recorded about 25 of these gulls at Stephenville Crossing. In 1956, and again in 1959, two more black-headed gulls that had been banded during the previous breeding season in Iceland were recovered in Newfoundland. On 19 December 1965 Tuck recorded 20 black-headed gulls in St. John's, and they have been regular, fairly common winter visitors to the capital city ever since.

The first evidence of black-headed gulls breeding in Newfoundland came in 1977, when Finch (1978) sighted a newly-fledged bird at Stephenville Crossing. Black-headed gulls are now known to nest at two sites in Newfoundland. In 1984 through 1986 they were found nesting on Ladle Cove Island, and in 1985 on Sandy Point Island near Stephenville (for details see Montevecchi, et al., 1987). Black-headed gulls have also been recently found breeding in low numbers in the Magdalen Islands in the Gulf of St. Lawrence (Aubry, 1984) and on Cape Cod, Massachusetts (Holt, et al., 1986). It is expected that the colonies in Newfoundland will continue to grow and that new colonies will be discovered. In 1985 young of the year were sighted on the Pinware River delta in southern Labrador (C. Brown, pers. comm.) and at Cape Freels in 1986 (see Montevecchi, et al., 1987).

The Ring-billed Gull is probably the most rapidly increasing breeding seabird in Newfoundland. In recent decades these gulls have shown phenomenal population growth in and around the Great Lakes region, which has resulted in considerable range expansion in many areas in eastern Canada.

Ring-billed Gulls have long been known to occur in Newfoundland. Merriam reportedly sighted three immature birds in southwestern Newfoundland on 19 April 1883, and Cahoon collected specimens at Bay of Islands and Exploits Bay in August of 1889 and 1890, respectively. Peters and Burleigh (1951b) obtained the first breeding record, when they found eight nests with eggs on South Penguin Island on 8 July 1945. There were approximately 75 pairs nesting on South Penguin Island in 1986. In 1952 Tuck located the first large colony on Browsey Island, where more than 500 pairs were nesting. The gulls are known to have occupied this site through 1958, but it was found deserted in 1962, at which time nesting birds were located about 30 km northwest of Browsey Island. The Burin Peninsula area is an important nesting area for Ring-billed Gulls in Newfoundland. There is a very large colony on Woody Island in Mortier Bay on the east coast of the peninsula, where in 1974, and again in 1984, there were estimated to be approximately 800 nesting pairs (J. Maunder, M. Boratra, and A. Debrosse, pers. comm.). In 1974, 822 nests were counted in two colonies on the French island of Miquelon that lies off the southern tip of the Burin Peninsula (M. Boratra and R. Etcheberry, pers. comm.). In 1974 there was a small colony on the Vicuni Islands (J. Maunder, pers. comm.), but the site has not been checked since then. In 1984 V. Birt, D. Cairns, B. Mactavish, and Montevec-

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chi located a colony of about 150 pairs on Kelly's Island in Conception Bay. The species also nests in southern Labrador and in 1980, 137 nests were counted on Tern Island (G. Hansen, pers. comm.). There are many undocumented colonies in Newfoundland, and summer sightings of large numbers of these gulls suggest breeding aggregations in the following areas: Conception Bay, the Cape Shore, the Southern Shore, Cape Freels, Stephenville Crossing, Deer Lake, and western Newfoundland.

Ring-billed Gulls are now common and very firmly established in Newfoundland. It is anticipated that they will become much more abundant in the years ahead and may come into competition with Herring Gulls for nesting and feeding sites, as the two species seem to overlap quite considerably in their reproductive and feeding habitats.

Thick-billed Murres are not recent immigrants to the island, but there have been some past misconceptions about their breeding occurrence. Aldrich and Nutt (1939), for instance, presumed that Thick-billed Murres were the only murre that bred in Newfoundland. Peters and Burleigh (1951b) took the opposite extreme and stated that Thick-billed Murres did not nest in Newfoundland. In their search of the material at the Museum of Comparative Zoology, Peters and Burleigh apparently overlooked J. C. Cahoon's specimens of an adult female (MCZ No. 186203) and of a nestling Thick-billed Murre (MCZ No. 186204) collected at Cape St. Mary's on 17 July 1890 (p. 116). Palmer (1890) also reported sighting a young Thick-billed Murre near Canada Bay in July of 1887.

For as long as we can tell, Thick-billed and Common Murres have been breeding in Newfoundland, which lies at the southern limit of the holarctic breeding ranges of both species (L. M. Tuck, 1961; Gaston and Nettleship, 1981). The number of Thick-billed Murres has probably always been low in Newfoundland; the species is much more abundant in arctic regions. There are no large colonies of Thick-billed Murres south of 60°N. lat. in eastern North America, whereas at higher latitudes some colonies are truly immense (L. M. Tuck, 1961; Gaston and Nettleship, 1981). In Newfoundland the present relative abundance of Thick-billed Murres ranges up to about 10% of the total murre population at colonies where there are steep cliffs (e.g., Cape St. Mary's), but they usually make up a very much smaller proportion of breeding murres (e.g., Funk Island). The intermingling of Thick-billed Murres with the much more abundant Common Murres at colonies in Newfoundland probably led early ornithologists, who tended to make brief one-day excursions to seabird colonies, to overlook the rarer, similarly-looking, congeneric species.

With the exception of the Ring-billed Gull, which is North American, all of the seabirds that have expanded their breeding ranges to insular Newfoundland recently are of European, Greenlandic, or Icelandic origin. The recent range expansions of the Manx Shearwater and the Northern Fulmar may well have been facilitated by large-scale, pelagic fishing on the Grand Banks. The large quantity of offal that is discarded by fishing vessels is cer-

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tainly at least partially responsible for the attraction of pelagic seabird species to Newfoundland waters. The expansion of the Ring-billed Gull appears to be a direct outgrowth of population increases in the Great Lakes region. The black-headed gull seems to have colonized North America from Europe via an Icelandic expansion route. This breeding range expansion may have been facilitated by a general warming of the North Atlantic in recent decades, and may also be related to population growth in Iceland which was first colonized at the start of the present century (Erskine, 1963; A. Petersen, pers. comm.).

SEABIRDS PAST, PRESENT, AND FUTURE

The legislative protection of seabird colonies allowed their populations to flourish in the present century, especially during the past 40 to 50 years. Evidence can be seen in the population trends of murres and gannets on Funk Island, and of puffins and murres in Witless Bay and on Baccalieu Island. Storm-petrels may have made large gains also, although the population levels of these birds have never been, and are not now, well-known. Herring and Great Black-backed Gulls have increased markedly (e.g., Witless Bay). Much of the success is simply a rebounding of populations from the decimated levels to which they were driven by unchecked exploitation in previous centuries. Most present populations, even large ones, are probably well below the levels in existence before European incursion into North America.

As the human population increased along the eastern seaboard of North America in the 18th and 19th centuries, seabird numbers plummeted in the face of slaughter (especially through market hunting and eggging) and habitat destruction. Hunting is still a major source of mortality for murres in Newfoundland waters (see Chap. 11). Many species, such as gannets, terns, and puffins, have been extirpated from former colonies in the Maritime Provinces and New England states (Kress, 1982, 1983). Despite the tragedy of the Great Auk, Newfoundland and Labrador are still more richly endowed with marine birds than most regions of North America.

Until recently there has been a tendency for scientists to conceptually fragment ecological complexes of species. Yet, in order to comprehend the significance of even such a seemingly simple matter as seabird populations, we are forced to take a broad view. For instance, capelin stocks, an important prey of many North Atlantic seabirds, have at times been in low availability since 1976 (Akenhead, et al., 1979; Carscadden, 1983a,b, 1984), an apparent result of overfishing by foreign fleets working in offshore waters and of a series of poor spawning years. Capelin are the primary food of alcids in Newfoundland, and shortages could adversely affect their success as well as that of other seabirds (Brown and Nettleship, 1984). Many fish (e.g., cod, salmon) and marine mammals also feed heavily on capelin. Biological investigations of capelin population dynamics (Carscadden, 1983b, 1984) are

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critical for understanding how energy flow between trophic levels in the marine ecosystem might influence seabird numbers. There is no longer any question about the interdependence of seabird and fisheries management, the problem now needs to be addressed from interdisciplinary perspectives (Burger and Cooper, 1984).

The commercial exploitation of petroleum reserves in the offshore waters of Newfoundland and Labrador present other modern hazards. All marine birds are vulnerable to surface oil spills, although alcids and seaducks are the most vulnerable because they spend so much time on and under water (L. M. Tuck, 1959; Norderhaug, et al., 1977; King and Sanger, 1979). The fledging period (from mid-July through early August) and winter are critical times when birds congregate in massive rafts in coastal waters. A small spill, or the persistent and more pressing problem of the deliberate flushing of tanks and bilges in the area, can inflict massive mortality. Whereas spills are usually of accidental cause, the cleaning of bilges and flushing of tanks are deliberate actions that should be simply controlled. These latter activities pose serious long-standing problems everywhere. In Newfoundland major shipping lanes between Europe and Canada and the northeastern United States converge south of Cape Race in winter. In summer much of this traffic is diverted north of the island and through the Strait of Belle Isle (L. M. Tuck, 1960). These major sources of pollution and seabird mortality can be prevented by requiring that burnt crank case oil be discharged on shore and that oil water be separated out and retained on board during tank flushing at sea (L. M. Tuck, 1960). There is little effective legislation with respect to the discharge of oil at sea and that on the books is impotent owing to lack of enforcement. The problem is seemingly ignored by responsible government agencies. The installation of tank and bilge flushing facilities in St. John's and other major seaports would provide a meaningful start to addressing this problem. Shipping activities around seabird colonies and sanctuaries should be curtailed during highly sensitive fledging periods.

The recent seabird population increases suggest a positive outlook, but populations were also high when Europeans first arrived, and at least some of the present favorable trend is the result of a rebounding of populations from decimated levels to which they were driven around the turn of the 20th century (see, also, Drury, 1973). Moreover, new breeders (Manx Shearwater, Northern Fulmar, Ring-billed and Common Black-headed Gulls) have colonized the province recently and are also building in numbers. With so much positive evidence it is crucial that conservation efforts be rigorously pursued. Such tasks are always more demanding when environmental situations are not dismal. Yet these are precisely the times when they are needed most; when the threats are blatant, it is often too late for effective action. Education and public awareness programs facilitate effective conservation practices. Inputs from biological researchers with regard to seabird populations and oceanographic conditions will be continually needed to provide future direction to conservation management programs.

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With the exception of waterfowl, ptarmigan, and shorebirds, most non-marine birds were of little utilitarian value to early explorers, seasonal fishermen, or inhabitants as food, fat, or feathers. Consequently, early written accounts contain little information about landbirds. These circumstances make the tracing of recent historical trends in the diversity, distribution, and abundance of Newfoundland's terrestrial avifauna a much more difficult and speculative task than tracing historical changes in seabird populations.

Sources of diversity in the terrestrial avifauna are also more varied and complex than those that influence seabirds. In this chapter we present some varied approaches to help explain some of this complexity. The global ranges of species that nest in Newfoundland are traced to assist in illuminating their regional origins. On a local scale, a survey of subspecies endemic to Newfoundland reveals adaptive radiation that has evolved since recent glaciations. Human disturbances, particularly through forest fires, firewood cutting, and logging, are the most significant influences that have changed avian habitats in Newfoundland; limited changes are also associated with farming, road and railway construction, hydro-electric developments, and transmission line corridors. On a more positive note, winter bird feeder provisioning has influenced the distributions of many passerines in eastern North America, including Newfoundland. We also review the avian species that have immigrated to, and begun breeding in, Newfoundland during the past 40 years. Navigational error and drift migration, facilitated by geographic weather processes and Newfoundland's location in the western North Atlantic have also contributed to more transient avian occurrences, which are considered in light of recent hypotheses. Some species have been driven to extinction by human hands. Non-native species have been introduced, and some European species introduced to continental North America have in recent decades expanded their ranges to Newfoundland. All these causes of historical avifaunal change are summarized.

COMPOSITION, DISTRIBUTION, AND REGIONAL ORIGINS OF THE NEWFOUNDLAND AVIFAUNA

Boreal landbird communities, in general, tend to be smaller and less variable (with individual species that are accordingly more abundant) than more tropical communities (Erskine, 1977). Similar differences characterize mainland versus insular communities, with the fewer species on islands often exhibiting wider habitat breadths (MacArthur, 1972). These patterns hold in broad comparisons of the breeding avifauna of insular Newfoundland with those of other temperate and tropical North American regions.

Of 143 species of birds that nest in Newfoundland (Appendix I), 38% (55)

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of them have Holarctic breeding distributions and 62% (88) breed only in the New World. Almost identical proportions are found among species that occur in, but do not nest in, Newfoundland. Holarctic species that breed in Newfoundland, with the exception of ptarmigan, the Winter Wren, and possibly a few others, probably radiated from Old World stocks (Mayr, 1946). Most avifaunal exchange between Nearctic and Palearctic regions took place across the Bering landbridge, which is responsible for the higher proportion of Palearctic species in the mountainous regions of western North America than in the east (Mayr, 1946). Whereas many seabirds exhibit "amphiatlantic" distributions (Lindroth, 1957) that are the result direct faunal exchange, often via Iceland and Greenland across the North Atlantic (e.g., Great Auk, Northern Fulmar, Manx Shearwater, Northern Gannet, Common Black-headed Gull, Great Black-backed Gull, Razorbill, and Atlantic Puffin; see, also, p. 181), the Northern Wheatear is the only comparable non-marine example of a North Atlantic immigrant. Although the Atlantic route has not been significant for the *breeding* landbird fauna (Mayr, 1946; L. M. Tuck, 1971), many of the island's unusual terrestrial vagrants arrive via such passage (Ingersoll, 1928; Bagg, 1967; L. M. Tuck, 1967a; Montevecchi, et al., 1981).

In a survey of insect and other invertebrate fauna Lindroth (1955, 1957) has emphasized the "Europeanization" of the Newfoundland fauna. Many Newfoundland invertebrate introductions are linked with European origins, especially southwestern England, from which ballast was transported to the New World. Most of these introductions are localized on the Avalon Peninsula, the center of European incursion, settlement, and trade. Intriguing as these patterns are, avian dispersal was little affected by early trans-Atlantic shipping and requires a different set of considerations.

Most birds that breed in Newfoundland also nest on the nearby North American mainland (L. M. Tuck, 1967a). Conversely and more interestingly, however, many species that nest in northeastern North America, including Nova Scotia, do not breed in Newfoundland. These occurrences suggest that the Cabot Strait and/or the island's more boreal climate and environment are effective barriers to some potential short-range expansions. An example of the Cabot Strait as a distributional barrier is provided by the Tetraonidae. Presumably having arrived via the Strait of Belle Isle, Willow and Rock Ptarmigan are common breeders in Newfoundland but not in more southerly locations in eastern North America. In contrast, Ruffed and Spruce Grouse, which are widespread on the nearby North American mainland, did not nest in Newfoundland until they were introduced in the 1960s. Mammals also illustrate Newfoundland's arctic affinity; the Arctic Hare and Caribou are native to the island, whereas the Snowshoe Hare and Moose were established by introduction (Dodds, 1983).

Mayr (1946) suggested that most of the avian species that are year-round residents in northeastern North America are of Palearctic origins. This also

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TABLE 18. Number of species of resident and migrant birds that breed in Newfoundland and that can be assigned to regions of origin (based on Mayr, 1946).

	REGION OF ORIGIN		
	NEARCTIC	PALEARCTIC	NEOTROPICAL
Resident	5	23	0
Migrant	32	11	11

holds well for Newfoundland landbirds. Of 28 species of Newfoundland residents that can be assigned regions of origin, 82% (23) are from the Palearctic (Table 18), the same percentage that Mayr (1946) generated for the birds of the New York region. These results are consistent with Stegmann's (1938, *in* Mayr, 1946) hypothesis that much of the Palearctic fauna, which evolved in the Siberian region, had been well-adapted for the rigors of North American winters. The data on migratory species also concur with Stegmann's hypothesis that the Nearctic and Neotropical faunas evolved in warm climes, and as a consequence must migrate out of temperate to more tropical areas during winter. In an analysis of the nonresident species that breed in Newfoundland, 80% (43/53) of those assignable to regions of origin are from the Nearctic and Neotropics (Table 18). Mayr (1946) presented similar results for migrants in the New York region.

Subspecific radiation among Newfoundland birds.—Newfoundland's avifauna is rich in forms that differ from mainland conspecifics. The proliferation of insular subspecific classifications (e.g., Stejneger, 1884; Brewster, 1885; Burleigh and Peters, 1948) is indicative of a widespread and large-scale radiation of the island's landbirds.

Many Newfoundland passerines tend to be darker and larger than the mainland conspecifics. Some ornithologists (e.g., Noble, 1919) have associated the tendency toward darker plumage with Newfoundland's damp and humid weather. Even on the island itself the plumages of some species (e.g., robin) tend to be darker in the wetter eastern portions than in the western areas, where most of the early ornithologists worked. The tendency for darker races to occur in humid (and warm) regions is widespread in many animals, and is often referred to as Gloger's Rule. Crypticity does not appear to be the responsible selective agent, as the pigmentation trend occurs in nocturnal animals as well (Mayr, 1970). To date no studies have attempted to test the possible thermal aspects of subspecific variation in plumage pigmentation. A listing of all the avian subspecies proposed for Newfoundland is presented in Table 19.

The last glacial ice receded from the island about 10,000 years B.P. (Macpherson and Macpherson, 1981), a date which can be used as a crude time

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TABLE 19. Subspecies proposed from specimens collected in Newfoundland.

NAME	SOURCE
Rough-legged Hawk, <i>Buteo lagopus sanctijohannis</i>	Banks, 1766.
*Willow Ptarmigan, <i>Lagopus lagopus alleni</i>	Stejneger, 1884
*Rock Ptarmigan, <i>Lagopus mutus welchi</i>	Brewster, 1885
Great Horned Owl, <i>Bubo virginianus neochorus</i>	Oberholser, 1914
Downy Woodpecker, <i>Picoides pubescens microleucus</i>	Oberholser, 1914
*Hairy Woodpecker, <i>Picoides villosus terranova</i>	Batchelder, 1908
Gray Jay, <i>Perisoreus canadensis sanfordi</i>	Oberholser, 1914
Blue Jay, <i>Cyanocitta cristata burleighi</i>	Bond, 1962
*Black-capped Chickadee, ¹ <i>Parus atricapillus bartletti</i>	Aldrich and Nutt, 1939
*Boreal Chickadee, ¹ <i>Parus hudsonicus rabbitsii</i>	Burleigh and Peters, 1948; Peters and Burleigh, 1951b
*Winter Wren, <i>Troglodytes troglodytes aquilonaris</i>	Burleigh and Peters, 1948; Peters and Burleigh, 1951b
*Veery, <i>Catharus fuscescens fuliginosa</i>	Howe, 1900a
Swainson's Thrush, <i>Catharus ustulatus clarescens</i>	Burleigh and Peters, 1948; Peters and Burleigh, 1951b
*Hermit Thrush, <i>Catharus guttatus crymophila</i>	Burleigh and Peters, 1948; Peters and Burleigh, 1951b
*American Robin, <i>Turdus migratorius nigriceps</i>	Aldrich and Nutt, 1939
*Yellow Warbler, <i>Dendroica aestiva amnicola</i>	Batchelder, 1918
*Ovenbird, <i>Seiurus aurocapillus furvior</i>	Batchelder, 1918
*Northern Waterthrush, <i>Seiurus noveboracensis uliginosus</i>	Burleigh and Peters, 1948; Peters and Burleigh, 1951b
Common Yellowthroat, <i>Geothlypis trichas quebeciola</i>	Oberholser, 1914
Savannah Sparrow, <i>Passerculus sandwichensis labradorius</i>	Howe, 1901, 1902, 1903
*Rusty Blackbird, <i>Euphagus carolinus nigrans</i>	Burleigh and Peters 1948; Peters and Burleigh, 1951b
*Pine Grosbeak, <i>Pinicola enucleator eschatosus</i>	Oberholser, 1914
*Purple Finch, <i>Carpodacus purpureus nesophilus</i>	Burleigh and Peters, 1948; Peters and Burleigh, 1951b
*Red Crossbill, <i>Loxia curvirostra percna</i> ²	Bent, 1912; Griscom, 1937

*Endemic to Newfoundland.

¹Also considered to breed on the nearby Island of Miquelon (A.O.U. 1957).

²*L. c. percna* later changed to *pusilla* (see Godfrey, 1959).

limit over which subspecies could have evolved. This time frame is consistent with conceptions that the landbirds of the boreal region are of relatively recent origin (Erskine, 1977). Lindroth (*in* Morris, 1983), however, has on the basis on entomological data argued for the existence of refugia during the most recent (Wisconsin) glacial period (see, also, p. 13; Rogerson, 1983). This circumstance could greatly expand the period during which subspecies could have evolved.

Of the many avian subspecies proposed for Newfoundland (Table 19), most are concentrated among the ptarmigan, woodpeckers, jays, parids, finches, thrushes, and warblers. With the exception of the last two groups, the composition of this list fits well with a general pattern that nonmigratory species tend to exhibit more racial differentiation than do migrants (Erskine, 1977); presumably the more sedentary nature of the nonmigrants has promoted the formation of isolated breeding populations. As indicated in the previous section, species resident in Newfoundland are mostly of Palearctic origin. Many of the proposed subspecies listed in Table 19, such as Oberholser's (1914) designations for the Great Horned Owl, Downy Woodpecker, and Common Yellowthroat have been rejected. Godfrey (1959) was highly critical of Burleigh and Peters' liberal treatment of subspecies and did not accept most of their designations (see pp. 137, 139). Yet there remains recognized potential for incipient subspeciation among some of the rejected races, as well as within species for which Newfoundland subspecies have not been formally proposed (Godfrey, 1959).

When Peters and Burleigh (1951b) published *The Birds of Newfoundland*, approximately 20% of the known breeders were considered to be racially distinct. Yet the assessment of subspecific variation on the basis of plumage and morphometric characteristics has traditionally been a subjective exercise (albeit with quantitative aspects) and, as has been shown, designations gain prominence and suffer extinction as the ball bounces back and forth between the "lumpers" and the "splitters."

The biological significance of racial variation depends on the extent to which phenotypes are expressions of the genotypes of inbreeding in relatively isolated populations, for it is genetic relationships, not appearances, that determine biological species, i.e., groups of organisms among which genetic material is exchanged (Mayr, 1970). Clearly, many of the subspecific designations made in the past are essentially arbitrary slices run through clinal variants (J. Rice, pers. comm.). Recent biochemical approaches to phylogenetic questions may aid in our understanding of subspecies concepts. Studies of song dialects have also widened our view of variations that can occur between groups of conspecifics living in close proximity. The significance of the subspecific designations of taxonomically oriented ornithologists will certainly be reassessed from different analytical perspectives in the years ahead. There is no question that subspecies classifications that have been rigorously derived have served, and can continue to serve, valuable heuristic functions (Fjeldså, 1985).

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HABITAT MODIFICATION BY MAN

Newfoundland has a small human population that is distributed coastally and, hence, the island has been much less influenced by humanity than have many places. As a consequence, popular misconceptions about the inexhaustibility of wildlife and natural resources have inevitably arisen (Erskine, 1977). Fire, wood cutting, and logging have had major negative consequences for birds. These and other negative, as well as positive, influences are considered in turn.

Forest fire.—The northern boreal forest can be characterized as a fire-dependent ecosystem (Kelsall, et al., 1977), and fire has been the dominant force in shaping the extent and composition of Newfoundland forests (Wilton and Evans, 1974). As discussed in Chapter 2, fires cause many Balsam Fir stands to be replaced by Black Spruce or deciduous trees. Fire is also responsible for the formation of the *Kalmia* barrens. Successional stages in the boreal forest often provide more diverse avian habitat than do the more monotypic spruce or fir forests that are characteristic of unburned areas or of logging company plantations (Erskine, 1977). In contrast to forests in more temperate climates, where succession is often an elaborate process, the differences between pioneer and climax stages of the boreal forest are not so great (Damman, 1964).

For the first 400 years of recorded Newfoundland history, most man-made fires were on the Avalon Peninsula. Early settlers often used fire to clear land as protection from surprise encounters with Beothuks and to keep wolves away from livestock. Fisherman also killed many trees along the coast by rinding them for bark to cover their fish flakes. In 1700 an Act by William III to encourage trade to Newfoundland forbade the setting of forest fires and the rinding of trees. This unenforceable Act went unheeded, as indicated by this excerpt from Lord Dartmouth's Report of 1706:

. . . in general the inhabitants have not due regard to the Regulations of the Act of Parliment, it being found that N. of St. John's as far as Carbonier and S. as far as Ferryland, the trees have been rinded and woods destroyed as much as before the Act.

Fishermen, however, were probably not responsible for the burning of the thick forests that extended to the shoreline in 16th century. Sir Humphrey Gilbert, during his visit to St. John's in 1583, was anxious to explore the "interior" and especially to examine distant hilltops for minerals. He considered burning the surrounding woods to gain access but was strongly urged not to do so by the fishermen. They believed that forest fire caused the souring of ocean water by turpentine from burning trees along rivers and streams, and resulted in fish deserting an area for many years (Quinn and Cheshire, 1972).

Wilton and Evans (1974) reviewed the forest fire history of Newfoundland for the period 1619–1960. Over 809,000 hectares were destroyed in 1904,

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more than in any previous year. By the late 19th century the railway crossed the island, and forest fires in the interior were caused mostly by coal-burning steam engines dropping hot cinders along the tracks. In 1911 Thomas Howe, the chief woods ranger, reported to the government that 1,165 of 1,193 fires were started along the railway. In 1935, 566,560 hectares of "productive" forest were burned out. By 1956 the trains had changed to diesel, and this major source of fire was eliminated. Yet, even after this date, owing to a lack of adequate fire-fighting equipment, fires caused mainly by careless picnickers and fishermen have continued to destroy large sections of forest. In 1961, an especially dry year, a large fire consumed 669,150 hectares of woodland. Many of these fires in the island's interior have led to the development of large deciduous tracts and consequently have had profound influences on the structure of the local avian habitats and communities.

The regeneration of coniferous forests has long been known to be changed by fire (Damman, 1964). In a 1768 letter to Governor Hugh Pallison, Lieutenant John Cartwright commented on the effects of fire in the Badger area:

I believe it was not until the fourth day that we observed the woods to change from birch and poplar to firs, pines and larch. They now evidently wore the face of antiquity, and pointed out the bounds of the fire, that about seventy years ago consumed all the wood from the north and south heads of the bay, up the river on both sides, far beyond the knowledge of any person till now: the islands only and some other small spots escaping which all at this time bear the marks of such an exemption by producing in a manner nothing but their original spruce, fir, etc., while the rest, formerly the same, is now converted into one continuous scene of birch and poplar (Howley, 1815).

While succession may change forest regrowth, after fire regeneration tends to be good in Newfoundland. The natural regeneration in the boreal forest after fire is Black Spruce, and many Balsam Fir forests that are burned are replaced by spruce. On rich sites fir may be replaced by White Birch and Pin Cherry. On fertile soil complete reforestation to commercial timber takes about 50 years. But repeated fires on the Avalon Peninsula have over the centuries destroyed the organic overlay and in many areas exposed the bedrock.

Fire wood cutting, logging, and the paper industry.—Fire has not been solely responsible for the modification of landbird habitat in Newfoundland since European incursion. From the time of the first seasonal occupations, and especially after settlement, Newfoundland's coastal woodlands fueled the stoves and hearths of the inhabitants. Fire wood cutting regimes soon exceeded regeneration, as evidenced at present by the many cleared coastal strips, and barren and boggy areas around current and former settlements (A. Erskine, pers. comm.).

Newfoundland entered the export lumber business on a large scale in 1890.

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At that time the logging community of Botwoodsville (now Botwood) arose, followed soon after by Glenwood, Badger, Gambo, Lewisporte, and Millertown (Page, et al., 1974). The industry was short-lived, owing to over-exploitation of White Pine; within two decades sawmilling was in sharp decline. Two large pulp and paper mills established at Grand Falls (1909) and at Corner Brook (1925), have exploited large tracts of forests throughout the present century, and are in full operation today. The pulpwood and paper industry discriminates against hardwood production (see below). Consequently, Balsam Fir now comprises 49% of "exploitable" forest lands (Page, et al., 1974), and deciduous trees are probably less abundant than in earlier millenia (J. Macpherson, 1981). Black Spruce is a preferred wood for making paper because of its long, strong fibers. This tree, however, tends not to regenerate in the thick moss understories with which it is associated (Damman, 1964).

Overall, careful logging practices may have less effect on changing forest composition than does fire (Damman, 1983). After cutting Balsam Fir tends to re-establish on the same sites (Damman, 1964). Succession in logged-out hardwood areas depends on the supply of Balsam Fir seeds; when present fir takes over, when absent the hardwoods (primarily White Birch) tend to regenerate (Damman, 1964). However, logging procedures have not always been carefully executed, and large tracts of land have been devastated to the extent that serious erosion has made many sites incapable of supporting any forest at all. Moreover, the application of toxic pesticides and herbicides by forest managers has the potential to create more environmental changes than has heretofore been imagined.

Pesticide and herbicide spraying.—The major insects that destroy trees in Newfoundland include the Eastern Hemlock Looper (larvae destroy Balsam Fir), Balsam Woolly Aphid, Balsam Fir Sawfly, Larch Sawfly, Spruce Budworm, Birch Casebearer, and Larch Casebearer. Chemical spray programs can be implemented to attempt to control all of these creatures, except the aphids which have a waxy exoskeleton and live in buds and crevices where aerial insecticides are ineffective (Page, et al., 1974). All of these insects are probably food sources for adult and nestling birds (Morris, et al., 1958). The primary target organisms of spray programs in Newfoundland have been the Spruce Budworm and Hemlock Looper.

Spruce Budworm outbreaks are part of the natural cycle of North American boreal forests. Infestations are accompanied by "outbreaks" of warblers (Morris, et al., 1958; Erskine, 1977), occur at about 25-year intervals, and tend to destroy huge tracts of forest that quickly regenerate (Hall, 1981). In recent decades chemical spray programs have been used to combat insect damage to the forest. There has been a mixture of failure and success with this approach to insect ecology. For instance, the DDT program initiated by the government of New Brunswick in 1952 was effective in holding the budworm population levels at about 20% of the expected peak. This approach, however, has developed into a program of annual spraying which has held

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the insect population at an intermediate, partially destructive level. The budworm's population cycle is no longer observed (Hall, 1981). In the late 1960s DDT, owing to its drastic effects on nontarget species and its environmental persistence, was phased-out and replaced by the non-persistent insecticide, fenitrothion (Kevan and Collins, 1974; see below); recently aminocarb has been used more extensively (Pearce, et al., 1979a,b).

Following an experimental program in 1977, the Newfoundland government implemented matacil (aminocarb) spray programs against the budworm in 1978 and in 1981 through 1986. The spray programs have produced changes in the avian communities, while not changing the overall community populations (Woodworth-Lynas, 1986). Further analyses and studies are needed to determine the biological significance of these findings.

A major environmental problem with pesticides is that while they are aimed at a single organism, they often kill a variety of nontarget species, that can include natural biological controlling agents, such as predators and parasites (NRCC, 1975; Hall, 1981). Nontarget insect pollinators can also be hit hard by chemical spray programs (Kevan and Collins, 1974; Rendell, et al., 1977). Such impact on pollinating insects carries deep implications for the reproduction and fruiting of many plants, including berry bearers that are important for human and nonhuman consumption. Up until 1972 it was estimated that New Brunswick lost \$1,000,000 in blueberry crop returns, as a result of off-target spraying (Kevan and Collins, 1974). Fenitrothion, for example, has also been shown to have devastating effects on aquatic insects, such as dragonflies and mayflies, that have the potential to result in the starvation of insectivorous fishes in contaminated fresh water (Coady, 1978). To complicate matters, spray programs *usually* result in substantial amounts of toxins falling outside the target area (Kevan and Collins, 1974; NRCC, 1975; Pearce, et al., 1979a; Hall, 1981). The mode of spray applications also influences impacts on the avian community (Pearce and Peakall, 1977; Pearce, et al., 1979b; Busby, et al., 1983a).

The birds most susceptible to aerial spraying are those that occupy upper to mid-forest canopy levels. In Newfoundland these include the Ruby- and Golden-crowned Kinglets, Gray-cheeked Thrush, Black-throated Green, Tennessee, Cape May, Blackburnian, and Bay-breasted Warblers, Northern Parula, and Evening Grosbeak (Morris, et al., 1958; Erskine, 1977; Pearce and Peakall, 1977; Pearce, et al., 1979b). Some lower story and even ground-dwelling species, such as the Ovenbird and White-throated Sparrow, may also be affected by aerial insecticide spray administrations (Morris, et al., 1958; Busby, et al., 1981, 1983b). Much more research is needed on bird/insect interactions, as well as on direct and indirect mortality due to spraying on different age classes and sexes of passerines (Bennett, 1977), and on the route(s) of fenitrothion uptake by birds (NRCC, 1975). Recent research on spraying effects on brain cholinesterase activity in songbirds (Busby, et al., 1981, 1983a,b) appears to provide a sensitive tool for future studies of some aspects of ecotoxicity.

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Some toxins, such as phosphamidan, have been found to be highly toxic to birds (Pearce, et al., 1979b), although, in general, avian populations have been resilient in the face of toxic contamination. The available data indicate that avian populations in intensely sprayed areas have suffered short-term setbacks, but have rebounded and exhibited no long-term population declines (Pearce and Peakall, 1977; Pearce, et al., 1979b). Such findings led Pearce and Peakall (1977) to conclude that after 25 years of chemical spraying in New Brunswick forests, both the Spruce Budworm and birds are faring well! These results also suggest a simple, straight-forward way of cutting government deficits and of eliminating toxic contamination of the environment in one fell swoop.

In 1986 fenitrothion was used by the Newfoundland Department of Forest Resources and Lands to combat hemlock looper infestations. An environmental impact study commissioned by the Department on the effects of fenitrothion spraying on forest songbirds revealed that 38.1% of the White-crowned Sparrows sampled showed brain cholinesterase activity that indicated "potentially life threatening exposure to fenitrothion" and 80% showed pesticide contamination. White-crowned Sparrows are considerably larger than the targeted hemlock loopers. These sparrows are primarily ground foragers and are also considerably larger than the presumably more vulnerable upper canopy foraging birds (see above) that could not be found in sufficient numbers to be sampled in a statistically meaningful way (a revealing finding in itself). In 1987, in the face of opposition from environmental groups and concerned citizens, the Department of Forest Resources and Lands went ahead with a massive fenitrothion spray program and with studies of the effectiveness of the safer biological control agent *Bacillus thuringiensis* or *B.t.*, that has been proven effective elsewhere. Whether or not the results of these investigations will be used constructively remains an open question.

Other biological controls for insect pests have also been tried in Newfoundland. For instance, Masked Shrews were introduced in 1958 to control the spread of the Larch Sawfly (Dodds, 1983). These animals are now widely distributed, though their effects on the sawfly have not been experimentally investigated.

Numerous biological and human health precedents point to a restricted use of synthetic toxins to deal with the ramifications of insect ecology. Many scientists and environmentalists seek greater emphasis on biological control and understanding leading to integrated programs of pest management (Hall, 1981; Newfoundland Wilderness Society, 1985). As a recent Canadian Environment Advisory Council report states (Newfoundland Wilderness Society):

Management of pest ecology is far from static. It requires constant adaptation and technical development to match the continual evolution of a living ecosystem. Perhaps one reason chemical sprays have been so readily accepted is that they require no sophistication or understanding of insect biology on the part of the applicator.

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In the early 1980s the government of Newfoundland and Labrador also initiated experimental spray programs of the herbicide 2,4-D. They have more recently solicited a forestry industry sponsored "impact study" (literature review and economic analysis) of herbicides and have given notice of intention to support a herbicide program if the study can justify it. Such justification will undoubtedly be evaluated primarily in economic rather than in ecological currency. Some herbicides that have been used in past decades in Newfoundland and across North America have recently been implicated as long-term health hazards to the men who applied the chemicals.

Bird conservation is an international affair. Because about 80% of the species in boreal North America are migratory and spend only about three to five months of the year in the north, environmental conditions in Central and South America may be primary determinants of the vigor and status of their populations (Erskine, 1977). The birds of the boreal region are a tolerant and adaptable group that appears capable of coping with many forms of environmental degradation (Erskine, 1977). They are not invulnerable, however, as some pesticide effects clearly show.

Other impacts associated with human settlement and population growth.—Other than through wood cutting, logging, and fire, there has been little human impact on avian habitats in Newfoundland, owing mainly to a low human population that is mostly distributed in small, coastal fishing communities. Limited ventures that result in some modification of avian habitat include farming, hydro-electric projects, and clearing for railways, roads, and power transmission corridors.

Less than one percent of Newfoundland has been cleared for agriculture and urban development (Page, et al., 1974). Consequently, the total quantities of pesticides and herbicides used by farmers is low. The clearing of farm fields have, however, provided new nesting habitat for Bobolinks and Savannah Sparrows, the latter are a common sight perching on the fenceposts about Newfoundland farmlands and meadows. As elsewhere, farm buildings provide nesting sites for Barn Swallows, and starlings, cowbirds, juncos, and House Sparrows are often associated with livestock and poultry feeding areas.

Newfoundland's urban and industrial development is not of the scale to generate major pollution like that found in North American population centers, although some local problems are associated with mining and logging operations. More intractable situations, linked to international and global pollution agents, such as acid rain, may well influence biotic communities in Newfoundland.

Hydroelectric projects involve the damming and diverting of waterways and the flooding of riparian and surrounding areas above dam sites; these have their greatest impacts on waterbirds (Erskine, 1977). The elimination of natural downstream flushing regimes and the large fluctuations of water levels in reservoirs destroy productive marshes (Erskine, 1977; Montevecchi,

et al., 1982); this can be especially critical in Newfoundland, where such habitat is very limited. Another very crucial problem is that hydroelectric developments in Newfoundland and Labrador tend to be built in inaccessible areas that are then opened to hunting, camping, and fishing enthusiasts via unmonitored access roads (Montevecchi, et al., 1982, and references cited therein). Inaccessibility has been a primary protection for boreal environments; measures that change this circumstance (e.g., roads, all-terrain vehicles) can indeed prove devastating (Montevecchi, et al., 1982).

The cutting of transmission line corridors through vast stretches of boreal forest is another ramification of hydroelectricity. Road and railway construction similarly produce edge areas of varied habitat structure, especially when run through closed forest stands. These increases in habitat complexity tend to increase species diversity. In Newfoundland alders usually establish themselves along roadsides, railways, and power line cuts and provide nesting habitat for Alder Flycatchers and Yellow, Mourning, and Wilson's Warblers (L. M. Tuck, 1967a). Other species that may frequent edge areas include White-throated Sparrows, robins, and juncos (Erskine, 1977). On the negative side, these corridors are often treated with herbicides to retard regeneration (J. Rice, pers. comm.).

Winter bird feeder provisioning.—Due in large part to Roger Tory Peterson's guide series initiated in the early 1930s, bird watching has become an increasingly popular leisure activity for millions of North Americans. An outgrowth of this activity has been a phenomenal increase in backyard feeding of birds during winter. Many people have planted ornamental trees, shrubs, and flowers that also provide fall and winter food sources. Abundant food provisioning, coupled with some mild winters, has been responsible for some overwintering of migratory species, and lingering birds and their wandering offspring have undoubtedly facilitated some northerly range expansions in eastern North America (e.g., Northern Cardinal, Northern Mockingbird, cowbird, and Tufted Titmouse).

One species that may have been influenced by feeder provisioning in Newfoundland is the Evening Grosbeak. This species, like many fringillids, at times shows "irruptive patterns" of large local population increases (Erskine, 1977), a demographic characteristic that facilitates range expansions. Newfoundland was the last leg of the grosbeak's phenomenal transcontinental expansion. Thirty years ago the Evening Grosbeak was considered "casual" in Newfoundland, based on a single specimen (Peters and Burleigh, 1951b). At present this species occurs in large flocks about feeding stations in winter and also breeds locally. The increasing numbers of this species recorded on Christmas Bird Counts in St. John's during the last 35 years reflects this trend (Fig. 36).

The higher number of sightings of Cedar Waxwings in recent years may be associated in part with garden plantings of American Mountain Ash, known

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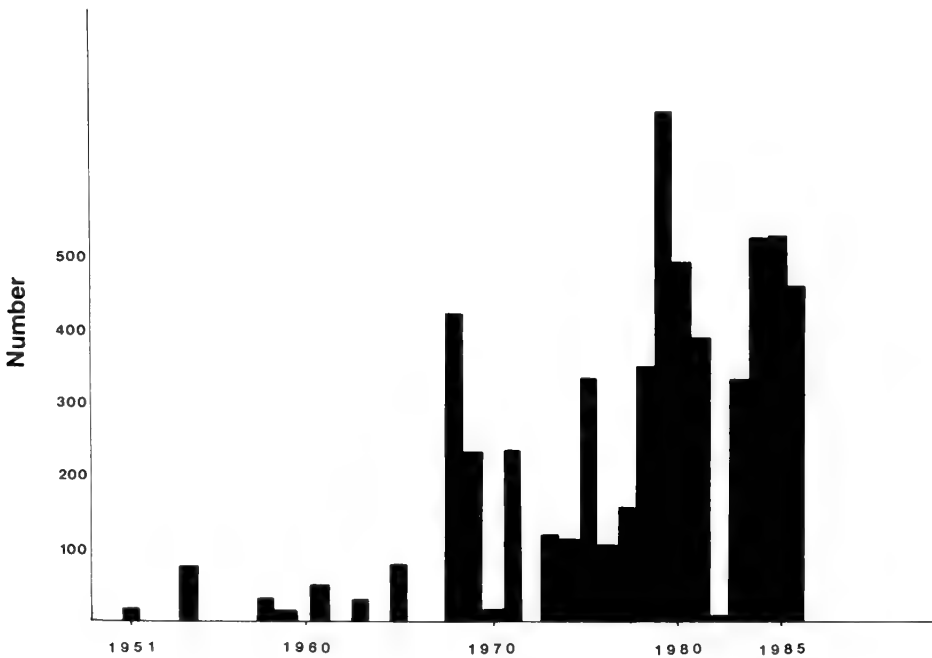


FIG. 36. Number of Evening Grosbeaks recorded on Christmas Bird Counts in St. John's, Newfoundland from 1950 to 1985. Not corrected for varying number of observers and hours spent counting.

locally as dogberry trees, that provide fall food sources for waxwings, robins, starlings, and other birds.

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A multiplicity of factors that vary from the subtle to the bombastic, including some of those cited above, are responsible for producing historical changes in the avian diversity of insular Newfoundland. Agents of change are both natural (i.e., range expansions, drift migration, and navigational error) and human-induced (i.e., some extinctions and introductions). Here we summarize what is known of the past effects of these processes, with a view to potential changes in the future.

Breeding range expansions to insular Newfoundland.—A comparison of the breeding birds listed by Peters and Burleigh (1951b) with those known as of 1987 (Appendix I) indicates some recent status changes. Most of these are the result of more intensive surveys (L. M. Tuck, 1967a) and of a greater knowledge of bird songs (A. Erskine, pers. comm.) in recent decades. For

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instance, the Alder Flycatcher, considered rare by Peters and Burleigh (1951b) and now classified as uncommon, may have been overlooked by early researchers. In other instances, such as the contention that Thick-billed Murres did not nest in Newfoundland, errors were the direct result of limited field work and museum searches (see pp. 115, 181). Here we discuss those species for which there is compelling evidence that a major change in status has occurred during the past 40 years. Many of these changes are part of larger-scale expansions in eastern and northeastern North America.

The freshwater ducks provide several clear examples of recent changes. The Greater Scaup is an uncommon breeding resident that was not even recorded by Peters and Burleigh (1951b). Mallards occur frequently now but also were not known to occur in 1951. American Wigeons, formerly considered to be of "accidental" occurrence based on a single specimen (Peters and Burleigh, 1951b; L. M. Tuck, 1967a) have been found recently nesting in the Codroy Valley, where sizeable flocks are regular in fall. The Northern Pintail and Ring-necked Duck, categorized as rare summer residents in 1951, are now common and widespread. The Ring-necked Duck, which was first recorded breeding in 1948 at Gander, has greatly extended its range in eastern Canada in recent years (Godfrey, 1966). One negative trend is suggested by Peters and Burleigh's (1951b) consideration of the Common Eider as a "fairly common summer resident." These eiders are now very uncommon in summer; human exploitation may well be responsible for recent, as well as historical, decreases in the breeding population in Newfoundland.

Among raptors, the uncommon occurrence of the American Kestrel, which was not recorded by Peters and Burleigh (1951b), is the most notable change. It is highly unlikely that previous ornithologists would have missed this conspicuous little falcon had it been present in any substantial numbers. Similarly, the Northern Harrier, another conspicuous raptor of open habitat, may have also increased in recent decades; they were previously considered rare.

Among the Rallidae, the Virginia Rail and Sora were considered "casual" in 1951; since then both species have been recorded nesting. Soras have been found nesting locally in marshy sites from St. John's to the Codroy Valley.

Some changes are evident among shorebirds. The Killdeer, which was considered accidental, is now a regular breeder. The Lesser Golden-Plover is more numerous in fall migration at present. This species, previously considered to be of "casual" occurrence on the basis of four specimens, is now a common fall transient on coastal *Empetrum* barrens. Lesser Golden Plover populations were severely reduced by market hunting in the 19th century, and their apparent increase in abundance over the last 40 years in Newfoundland probably indicates a gradual, sustained recovery. Hudsonian Godwits were not recorded in 1951, but are now uncommon, though regular, fall migrants. Piping Plovers, which have been faring poorly throughout their breeding range owing to human disturbance of their beach nesting

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habitat (Cairns and McLaren, 1980), may have been more abundant in the 1940s, when they were considered fairly common summer residents in southwestern Newfoundland. These plovers are very uncommon nesters at present, even though their nesting habitat in Newfoundland has probably been less disturbed than elsewhere in North America.

Many passerines also have changed status since the 1940s. Some of the most striking examples are detailed here. The Cedar Waxwing, classified as rare in the 1940s, is now much more locally common. In 1951 the European Starling was known to nest only in western Newfoundland, with small numbers overwintering in St. John's (Peters and Burleigh, 1945, 1951b). L. M. Tuck (1958) traced the starlings' spread from western to eastern Newfoundland from the time of the first sighting in 1943 through 1956, when starlings occupied all coastal areas of the Avalon Peninsula. In less than a decade of its arrival in eastern Newfoundland the starling clearly established itself as a nuisance species. Today they can be found on the cliffs of Baccalieu Island, standing shoulder to shoulder with Razorbills and nesting in similar crevices, an interesting sympatric relationship. The House Sparrow was well-established in Newfoundland in the 1940s. In fact, Peters and Burleigh (1951b) argued that by that time it may have been in decline from previous levels because of the replacement of the horse by the automobile, eliminating much of the manure from which the sparrows obtained undigested seeds and grain. When and how the species established itself on the island is unknown. The House Sparrow first appeared on Cape Breton Island, Nova Scotia in 1889 (Christie, 1979) and likely reached Newfoundland around the turn of the century. Residents informed Peters and Burleigh (1951b) that House Sparrows in Lewisporte had been transported directly from England by ship, so the species may have reached Newfoundland both via the Cabot Strait and the North Atlantic.

As noted in previous sections, the large number of specimens of Yellow-bellied Sapsucker collected in the late 19th century (p. 122) suggests that the species' overall abundance may have been higher then than now. These birds were categorized as uncommon summer residents in 1951, and as rare breeders in 1986, suggesting yet a possible further decrease in the past 40 years. The species has, however, probably always been locally abundant in certain sites in western and central Newfoundland that are not regularly checked by bird biologists or enthusiasts.

A number of status changes are evident among the wood warblers. Most notable was the apparent scarcity of the Tennessee Warbler; Peters and Burleigh observed it only once and considered it rare. At present it is widespread and common, especially on the west coast, where Peters and Burleigh did much of their collecting. The Yellow-rumped Warbler's previous classification as uncommon suggests that it was less abundant then than now. Many of the scarcer warblers (Bay-breasted, Nashville, Parula, Cape May, Blackburnian, Canada) were not recorded by Peters and Burleigh (1951b);

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it might be speculated that had these species been present former workers would have documented at least some of them. However, before the 1960s very few ornithologists relied on song for identification, and these scarce species could easily have been missed (A. Erskine, pers. comm.).

Some changes are evident among icterids. The Bobolink was not recorded in 1951 but is now regular in the hay fields of western and eastern Newfoundland. The common Grackle was previously considered common but is not today. The Northern Oriole, which was classified as "casual," occurs regularly during autumn. The Brown-headed Cowbird was first documented for Newfoundland in 1955; since then the species has become an uncommon resident in agricultural areas. The Red-winged Blackbird, not recorded in 1951, breeds in the few cattail marshes on the island.

The Evening Grosbeak and American Goldfinch were considered to be "casual" in the 1940s, but are more common today (Fig. 36) and are known to nest. Tree Sparrows breed abundantly on the Long Range Mountains (Lamberton, 1976a; Montevicchi, et al., 1982); Peters and Burleigh's (1951b) classification of them as uncommon transients is probably a result of their not working in these mountains.

The above documentations clearly show that even on a time scale as brief as 40 years, change is the rule rather than the exception. The extent to which future changes can be quantitatively assessed with standardized techniques, such as breeding bird surveys, will set the limits of our understanding. Changes will be more fully interpretable in terms of past occurrences and in terms of wider North American patterns.

Vagrancy and seasonal geostrophic wind patterns.—Newfoundland is very well situated to pick up vagrants, as evidenced by even a casual perusal of the records of species occurrences (Appendix I). The island is the first North American landfall for birds moving westward from Greenland, Iceland, and Europe, and the final one for birds travelling eastward across North America. Likewise, southern species moving over water, along or off the coast, in a northeasterly course may also touch down in Newfoundland. About 40% of the extant species are classified as vagrants. Many occurrences were first Canadian and first North American records, and include a large number of other continental rarities as well (Table 20). These findings are even more striking when considered in view of the island's low human population and its small number of bird enthusiasts compared to other North American areas.

A number of hypotheses have been advanced to account for the high incidence of vagrant birds in northeastern North America (L. M. Tuck, 1967a; McLaren, 1981). An analysis of vagrancy on three Nova Scotia islands led McLaren (1981) to suggest that mirror-image orientation and reverse migration were of paramount importance in bringing landbirds from remote regions to Nova Scotia. Continental air masses and windstreams converge in the western North Atlantic and also facilitate vagrancy in the region (L. M.

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TABLE 20. First North American (**) and first Canadian (*) occurrences and other notable vagrancy records for insular Newfoundland.

Magnificent Frigatebird	Black-billed Magpie
**Little Egret	Blue Gray Gnatcatcher
**Cattle Egret	Townsend's Solitaire
*Greater Flamingo	Fieldfare
*Pink-footed Goose	*Redwing
Barnacle Goose ¹	Blue-winged Warbler
*Tufted Duck	Townsend's Warbler
*Corn Crane	Yellow-throated Warbler
*Eurasian Coot	Prothonotary Warbler
Northern Lapwing	Kentucky Warbler
*Greater Golden Plover	Hooded Warbler
*Common Greenshank	Summer Tanager
European Whimbrel	Blue Grosbeak
*Black-tailed Godwit	Clay-colored Sparrow
*Eurasian Woodcock	Lark Bunting
Ross' Gull	LeConte's Sparrow
Bridled Tern	Chestnut-colored Sparrow
Lewis' Woodpecker	Yellow-headed Blackbird
Western Kingbird	Common Chaffinch

¹First North American band recovery (from Spitsbergen; see Montevecchi and Wells, 1984c).

Tuck 1967a; McLaren, 1981; Fig. 37). Storm tracks moving from the Caribbean along the United States coast and out into the North Atlantic often pass Newfoundland. While these storms at times produce "fallouts" of large numbers of seabirds (L. M. Tuck 1968), they rarely carry distant landbirds to the region (McLaren, 1981). Salomonsen (1951), however, details an interesting example of how the Fieldfare expanded its range from Europe to Greenland. In 1937 wind-driven flocks, apparently from southern Norway, reached Greenland and eventually colonized the island. Oceanic islands function like oases to wayward birds and draw in strays from a large area of the surrounding sea and air (DeSante and Ainley, 1980; McLaren, 1981). On an island as large as Newfoundland, the coastal headlands, bays, and "habitat oases," such as the deciduous tree stands in St. John's, are often the best sites to find vagrants.

We have attempted to gain a comparative perspective on the origins and diversity of vagrancy in Newfoundland by using McLaren's (1981) analytical procedures for islands in Nova Scotia. Following that study, a "remote vagrant" is defined as any landbird species that does not nest or normally migrate or "erupt" into the area, however rarely; a "southern vagrant" is defined as a species mapped by Robbins, et al. (1966) as not breeding north of Cape Cod, Massachusetts in the east, although possibly nesting farther north in the midwest; and a "western vagrant" is defined as a species mapped by Robbins, et al. as breeding west of Lake Michigan. We also added a cat-

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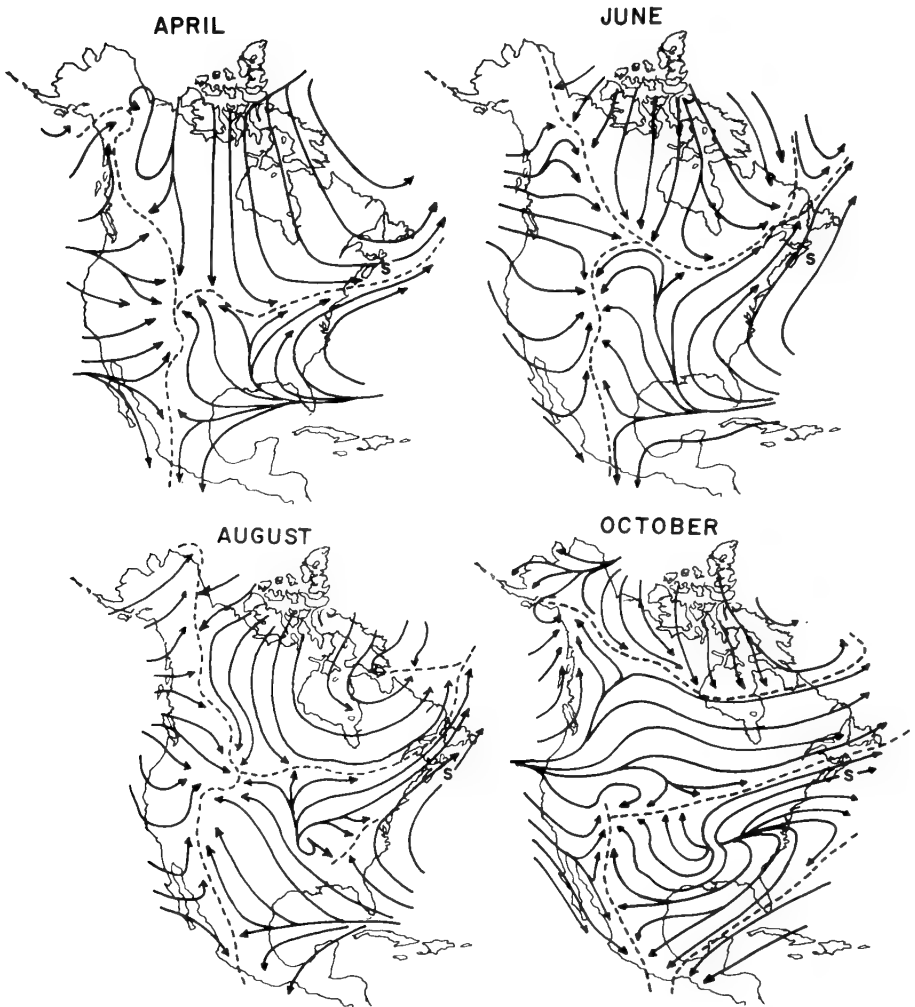


FIG. 37. Seasonal patterns of air streams over North America at the surface or 1000 mbar, whichever is higher, and boundaries between major air masses (courtesy of I. McLaren).

egory for European species. With these criteria, 21 passerines can be categorized as remote vagrants, less than half the number recorded from just three Nova Scotian islands (McLaren, 1981). These data support McLaren's contention that the number and diversity of vagrant landbirds is greater in Nova Scotia than elsewhere in eastern North America. Species from western North America comprise the largest proportion of vagrants in both Newfoundland and Nova Scotia, though they make up less than 50% of the Newfoundland total and more than 50% of the Nova Scotia total. The biggest difference between locations is that European vagrants accounted for about

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20% of the Newfoundland total, but did not figure in the Nova Scotia data. If herons, waterfowl, shorebirds, seabirds, and other large nonpasserines are included, the picture changes markedly, and European vagrants make up 38% of remote vagrants in Newfoundland. Furthermore, many members of Newfoundland's regular avifauna are of European, Greenlandic, and/or Icelandic origin. For example, Manx Shearwaters, fulmars, kittiwakes, Great Skuas, Oldsquaw, Purple Sandpipers, Thick-billed Murres, Dovekies, Razorbills, puffins, and Snow Buntings banded in these areas have been recovered in Newfoundland (L. M. Tuck, 1971). The larger water birds are clearly better able to survive trans-Atlantic journeys than are passerines.

The Northern Lapwing is a European vagrant that occurs fairly often in Newfoundland but rarely elsewhere in North America. This species has occurred in Newfoundland on at least ten occasions from 1905 to 1983. In December 1927 Lapwings made a phenomenal "invasion" into eastern North America, with Newfoundland at the focal point (Bagg, 1967). The total number of lapwings reaching Newfoundland was probably in the thousands (Witherby, 1928). A bird which was taken at Bonavista on 27 December 1927 had been banded as a nestling the year before at Ullswater, Cumberland, England. Another notable "invasion" involving fewer individuals took place in January 1966.

In Newfoundland, as in Nova Scotia, most western and southern landbird vagrants occur in autumn (Table 21). Large nonpasserine vagrants in Newfoundland also peak in the fall but tend to show a more even distribution throughout the year (Table 21). The small number of European landbird occurrences in Newfoundland are not clustered in any particular season.

For geographic, meteorological and biological reasons, unusual occurrences can be expected regularly in Newfoundland (Fig. 23). Some evidence suggests that vagrancy may have increased since the turn of century and may be related to human habitat disturbance (McLaren, 1981). In view of this latter possibility, the long-term study of distributional and temporal patterns of avian vagrancy may one day be integrated into larger ecological perspectives.

Extinctions.—Three recent extinctions are relevant to a consideration of Newfoundland landbirds. Of these only the Eskimo Curlew, which apparently still exists in extremely low numbers elsewhere, is known to have definitely occurred in Newfoundland. Yet both the Labrador Duck and Passenger Pigeon are likely to have been present formerly. The latter species nested in Nova Scotia and New Brunswick, and there are winter records for the Labrador Duck in both these provinces (Godfrey, 1966).

In contrast to the Eskimo Curlew and Passenger Pigeon, Labrador Ducks are thought never to have ever been very numerous (Godfrey, 1966). Very little was actually known about this beautiful diving duck (see Fig. 38) before its extinction. It is not known if it ever nested within the area politically designated as Labrador today. The last known living Labrador Duck was shot in April 1871 on Grand Manan Island, New Brunswick (Godfrey, 1966).

TABLE 21. Regional and seasonal trends in the occurrence of vagrants in Newfoundland (see text for definitions).

SEASON	ORIGINS OF LANDBIRDS				ORIGINS OF LARGE NONPASSERINES AND SEABIRDS			
	WEST	SOUTH	EUROPE	TOTAL	WEST	SOUTH	EUROPE	OVERALL
Spring	3	2	0	5	3	5	10	18
Summer	5	0	1	6	6	5	6	17
Fall	6	5	1	12	5	9	12	26
Winter	3	0	2	5	3	1	5	9
Totals	17	7	4	28	17	20	33	70
								98

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The reasons for the species' extinction are also unclear, though Godfrey (1966) contends that low numbers and its less than delicious taste weigh against the notion that these ducks were hunted to extinction. There is some suggestion that the species had a very restricted breeding range and may thus have been highly vulnerable to disturbances wreaked by the professional eggers and plumage hunters of the previous century (p. 84). The idea of restricted nesting areas is also reminiscent of the Great Auk's situation.

The early accounts of Cartwright and Banks indicate that Eskimo Curlews were long considered table delicacies (Fig. 21). They were hunted heavily in autumn, when huge southerly-moving flocks fattened on the crowberry barrens before their long migration to South America. Pressures inflicted farther south by market hunters in the late 19th century exceeded levels that the populations could sustain, and these curlews were soon decimated (Forbush, 1912; Peters and Burleigh, 1951b; Godfrey, 1966).

The demise of the Passenger Pigeon at the hands of market hunters is

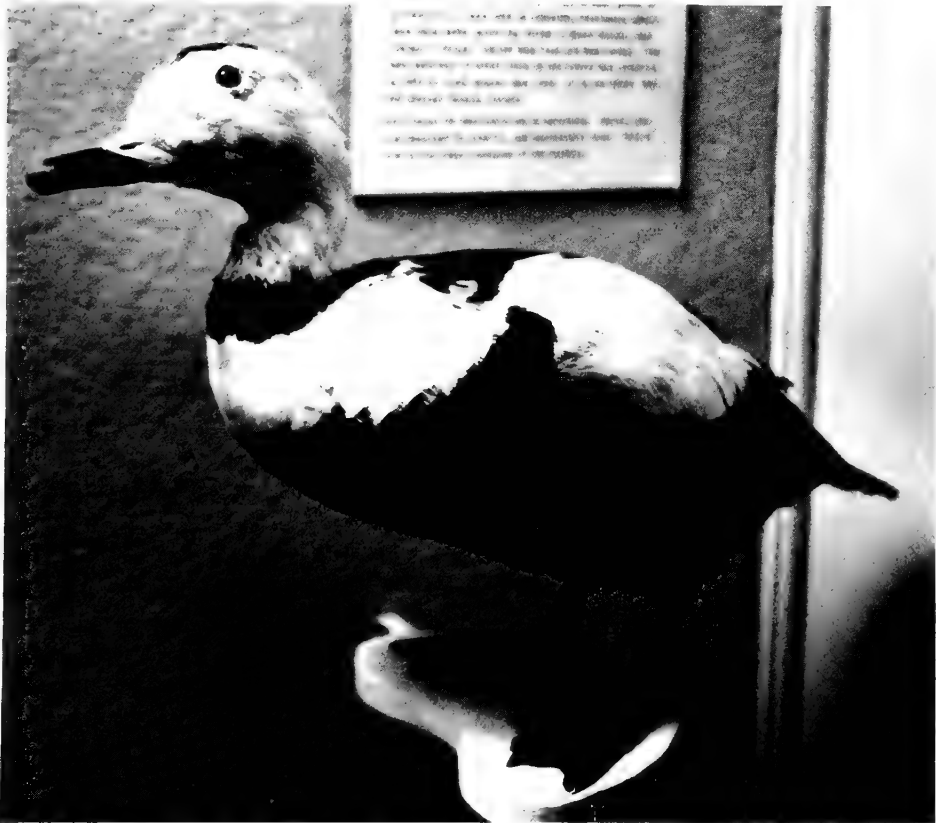


FIG. 38. Mounted specimen of a male Labrador Duck in Museum of Comparative Zoology, Harvard University (photo: WAM).

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also well-documented. Historical references to migrating flocks that darkened the sky and to nesting colonies that occupied hundreds of square kilometers (Godfrey, 1966) bring to mind Whitbourne's perception of the "infinite abundance" of Great Auks. If conservationists have learned anything from the pages of ornithological history, one major realization has to be that the phenomenal abundance of species is not closely linked to its perpetuity.

Introductions.—Successful introduction of a non-native species is the most direct way to change a local fauna. The repercussions of such actions are often immense (e.g., starling, House Sparrow). Well-intentioned, but usually heedless, nature and sport-hunting enthusiasts have often gone to great lengths to introduce exotic and game species. Newfoundland has been a testing ground for many introductions that have been carried out with little forethought given to a species' habitat requirements and its potential competition with native animal communities.

Of the 332 birds documented to have occurred in Newfoundland (Appendix I), six were introduced; four directly (Spruce and Ruffed Grouse, Rock Dove, Ring-necked Pheasant) and two that were introduced to North America from Europe and eventually spread to Newfoundland (starling, House Sparrow).

Following introductions to mainland North America it was not long before the ubiquitous starling and House Sparrow established themselves in Newfoundland. After releases in Cincinnati, Quebec, and New York City in the late 1800s, starlings took about 60 years to reach Newfoundland (p. 199). The House Sparrow was widely introduced in North America during the latter half of the 19th century. Both species are resident throughout Newfoundland and are probably increasing in abundance annually, although the sparrows often exhibit quite large population fluctuations over periods of a few years. They are strong competitors with other hole-nesters, such as Tree Swallows and woodpeckers, and their large population increases are cause for ornithological concern. A third European introduction to North America, the Rock Dove, is also a well-established resident on the island, having escaped from domestic aviaries since 1950 (Peters and Burleigh, 1951b). In view of the phenomenal spread of the above species in North America, the recent range expansion of the House Finch in the northeast may foretell another species that will soon occur in Newfoundland.

Most direct introductions to insular Newfoundland have been gamebirds. Some have succeeded remarkably well; most have failed. Following their research in Newfoundland, Peters and Burleigh (1951b) suggested that Ruffed and Spruce Grouse were well-suited to the island's habitat and might be successfully introduced. They were correct, and both species, released in the 1950s and 1960s, are now established. The Ruffed Grouse is greatly expanding its range and is becoming an important gamebird, whereas the Spruce Grouse is much more limited in abundance and distribution, but is also in-

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creasing. Both species appear to be occupying niches that were relatively unexploited by indigenous birds.

The Ring-necked Pheasant has not been nearly so successful. Fifty were released in St. John's in 1962 and 289 chicks were released at Argentia in 1963. A few nests were found in the 1960s, and these birds are still infrequently sighted and heard in the St. John's area, though some recent reports are of accidental escapes. At present their numbers are too low to consider them firmly established. The Common Capercallie, Eurasian Black Grouse, and Golden Pheasant were also unsuccessfully released in Newfoundland. Almost all introductions of Old World grouse into North America have failed (Bump, 1963; Blake, 1975).

Some introductions of mammals, insects, and plants are also relevant to avian considerations. For instance, mink and domestic cats and dogs have certainly had effects on birds. As discussed above (p. 196), plantings of introduced berry-producing trees and shrubs have provided new avian food supplies, whereas introduced insects, e.g., Balsam Woolly Aphid, Larch Casebearer, and Larch Sawfly (Morris, 1983) eliminate potential feeding and nesting habitat by destroying trees.

At present wildlife managers tend to be highly sceptical and cautious about any sort of non-native species introductions (Allen, 1954). As the record shows, well they should be.

CONSERVATION AND PRESERVATION

Whitbourne's (1622) proclamation about the "infinite abundance" of Great Auks on Funk Island, divinely provided for the sustenance of man, sounded the tone for wildlife exploitation in the New World that persisted for centuries. Views on the abundance, use, and conservation of wildlife changed gradually, but radically, over the years. Past centuries have been witness to the decimation of massive breeding stocks of seabirds and eiders. The Great Auk was killed-off completely. The wanton destruction caused by the commercial eggers has been described in the writings of Audubon, Frazar, Townsend, and others. Market hunting, which was concentrated in the more populated areas of the eastern states, devastated the populations of migratory coastal birds, especially during the late 19th century (Forbush, 1912; Swenk, 1915). The Eskimo Curlew and Labrador Duck soon disappeared from the gunners' sights, and from everyone else's as well.

In the present century seabird populations have increased substantially in northeastern North America, owing primarily to legislative protection during the breeding season. Moreover, many species have recently expanded breeding ranges into the region. Here we survey changes in perspectives regarding conservation and the legislation that promoted the present state of affairs, and take a look ahead.

OLD WORLD CONVENTIONS AND NEW WORLD PRACTICES

North American wildlife exploitation has evolved through a three-stage progression since Europeans first arrived on the eastern seaboard almost five centuries ago. These developments can generally be characterized as consumptive, recreational, and nonconsumptive. The earliest European immigrants took an adversarial approach to the wilderness, with an aim to its conquest. They were completely unrestrained in their efforts to advance civilization (Nash, 1967; Lund, 1980). Early settlers broke with British tradition and rejected the exclusive use of wildlife by property-owning sport hunters. The English Parliament had virtually awarded the gentry a monopoly on wildlife, using high social ranking and landed wealth as prerequisites for sport hunting. Statutes prevented the poor from taking wildlife, and even denied them the right to protect their crops from destructive animals (Lund, 1980). In contrast, North American wildlife was treated as a resource rather than as an object of sport (Lund, 1980), and wild animals, like all natural resources, were public domain, free for the taking. The exclusive use of wildlife by landed Englishmen was seen by North American legislators as an elitist policy that subjugated the masses (Lund, 1980). In this sense, North American wildlife laws were socialistic in comparison to the British rulings. Viewed in this light, all early attempts at conservation in North America ran

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contrary to pioneering ideals and were seen as devices that would put wildlife back under aristocratic control (Lund, 1980).

Sharp contrasts soon emerged between private and public users. The former protected "their" game, whereas the collective public owners attempted to out-do one another in getting bigger individual shares of the harvest. Conservation was a common practice of individual landowners, whereas over-exploitation was, and often still is, public practice (Leopold, 1966).

Even though free-taking was the fundamental North American policy toward wildlife, an awareness of animals as a renewable resource did develop, and some legislative policies were aimed at sustaining harvests over time (Lund, 1980). However, as the "infinite abundance" of New World wildlife continued to decline over centuries of wanton exploitation through the use of progressively more sophisticated, and destructive, weaponry, North American ideals drew into closer alignment with British ones.

It took about 300 years of unrestrained exploitation before the inadequate and short-sighted nature of North American wildlife practices were fully realized. By the late 19th century the stocks of many species were decimated and others extirpated completely. Moreover, as North America became settled the notion of free-taking quickly and inevitably came into conflict with the landowners' rights of trespass. For the most part, early rulings fell in favor of public rights (Lund, 1980). Such emphases are evidenced in present-day public access rights to inland and coastal shoreline areas.

As the wilderness was "conquered," the inhabitants' adversarial approach to nature mellowed. More and more of the growing population settled into living patterns with standards well above subsistence levels; in the 20th century the chief value of wildlife exploitation became sport. This trend marked the second phase of North American wildlife exploitation which was characterized by a proliferation of legislation that, first, sharply curtailed and soon eliminated utilitarian endeavors, such as market hunting and, second, emphasized the recreational (sport hunting and fishing) values of wildlife. Consequently, "game" species were given most attention, and conservation policies were directed toward them. Once outlawed, market hunting, which had extracted such a heavy toll of migratory birds, died a rapid death. Sport hunters replaced market gunners, and in doing so were true saviours of North American wildlife populations (Lund, 1980). The implementation of hunter licensing schemes, that accompanied these new emphases on game concerns, came to generate substantial revenues, which were used to bolster management and conservation policies (Allen, 1954; Lund, 1980). Recreational hunting interests maintain powerful lobby forces today. Much of their influence is economic, but hunting is also important to many because it provides the only legal use of weapons outside of target-practice and self-defense (Lund, 1980). The image of self-sufficiency portrayed by the hunter was, and still is, a potent symbol of the independent North American.

In the third phase of wildlife utilization in North America, late 20th century conservationists developed preservationist ideals that embodied new

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ethical, aesthetic, and ecological perspectives from which animals were valued for strictly nonconsumptive purposes. Wildlife was esteemed for its appeal to natural history enthusiasts, such as bird watchers, hikers, photographers, campers, and so on. Faunal diversity was seen as a vital component of the human ecosystem and as an indicator of environmental quality. Nonconsumptive users are, however, often highly selective in the species that attract their interest and attention, usually focusing on animals with strong visual appeal. Trends toward nonconsumptive use are reflected in a replacement of "game" with "wildlife" terminology in most recent legislative policies. The establishment of national park systems, and of policies which prohibit hunting, is testimony to more recent wildlife interests that oppose sporting ones. Whereas game adherents focus on enhancing of the abundance of key species, protectionist proponents strive, in general, for wildlife diversity. Such contrasting perspectives are easily seen in a comparison of wide-ranging federal conservation efforts with regional, provincial, and state harvest objectives. These approaches can be complementary, and undoubtedly the combined efforts of diverse interest groups will be needed to confront future economic demands on wildlife habitat (Lund, 1980).

EARLY USES OF BIRDS IN NEWFOUNDLAND

Seabirds were often used for bait, and fishermen on the Grand Banks caught birds with floating hook lines (Collins, 1882; Templeman, 1945). In 1611 John Guy petitioned his British company to request that nonresident fishermen not take birds at Baccalieu Island for bait, because it interfered with the vested use of his Conception Bay colony. In 1618 an ordinance formalized this prohibition (Rogers, 1911). The exploitation of the birds of Funk Island, especially the Great Auk, was important at the time for food, feather mattresses, and oil.

North American seabird colonies also provided crucial navigational information for mariners. Early explorers to Newfoundland often avoided what might have been disastrous shipwrecks in the fog by steering for Baccalieu Island, where the large seabird community warned of the approach to land. Fishermen homed-in on seabird flocks in their search for fish. European fishing boats depended on sightings of Great Auks for assurance that they had arrived on the Newfoundland fishing banks (p. 52). As Anspach (1819) warned, unrestrained hunting and harvesting were incompatible with such usages and this became increasingly evident during the 19th century.

The importance of seabirds to the economy and way of life of the early settlers cannot be overstated. Complaints to the Home Government about the over-exploitation of resources, especially of Great Auks on Funk Island, generally carried little weight because there were no local laws that could be legally enforced. Chief Justice Reeves was appointed the first colonial magistrate in 1792. One of his most publicized trials resulted in the conviction in 1793 of several men from Greenspond accused of taking Great Auk eggs

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from Funk Island in closed season. Reeves, who had a reputation of high character and a strict sense of justice, at times strained the quality of mercy to the breaking point. It was proved that one culprit, a man named Clark, took the eggs solely to save his wife and children from starvation. Reeves sentenced the other prisoners to be publicly whipped but, because of the mitigating circumstances, Clark was flogged in private.

According to British Museum records, the Act of Parliament which Reeves enforced was an "Act against Destruction of Wildfowl" of 1533, which prohibited the "taking of . . . any manner of eggs of any kind of wildfowl from or in any nest, place or places where they shall chance to be laid by any kind of wildfowl. . . ." The Act was repealed in 1831, and it was over a decade before Newfoundland had its own wildlife conservation laws (p. 213), with less stringent penalties, however, than flogging. During this early period of law enforcement in the colony, a magistrate received the considerable stipend of two guineas, or more, for each trial; an eager magistrate could earn a substantial salary.

MAN AND AVIAN MORTALITY

Hunting is still a major cause of seabird, waterfowl, and landbird mortality in Newfoundland. It has been estimated that approximately 500,000 murres (mostly *Uria lomvia*) are killed each winter in the province (Wendt and Cooch, 1984; A. Gaston, pers. comm.). The majority of these birds are from breeding colonies in Greenland and the Canadian Arctic. Many other seabirds such as Dovekies, puffins, shearwaters, and kittiwakes are also illegally taken (see below).

More modern problems also influence seabird mortality. Multitudes of seabirds and waterfowl die each year as a result of oiling from ship discharges and spills (Phillips, 1931; Templeman, 1945; L. M. Tuck, 1959, 1960, 1961; see p. 183).

Gill nets set for cod and salmon entrap large "by catches" of seabirds near colonies (Piatt, 1984), where birds, cod, and capelin are concentrated during summer months. Overfishing of seabird food stocks may also pose a serious problem. In the North Sea, off coastal Oregon, and in South African waters it has been estimated that marine birds consume massive tonnages of pelagic fish and that their harvests may compete with those of human fishing industries in the areas around colonies (Furness 1983; Duffy and Siegfried, 1987; also, see Chapter 9).

A complex interaction of events has greatly influenced bird life in Newfoundland. Habitat destruction and disturbance by humans during the breeding season have been major threats to birds. The relatively unindustrialized Newfoundland economy has created few pollution problems. However, on regional and global ecosystem scales, it is clear that current levels of environmental pollution that are generated at distant locations can influence local conditions. Recent administrations of insecticide and herbicide

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sprays, which sustain artificial forestry monocultures, affect avian communities, and systematic studies are needed to quantitatively assess the impacts of these environmental poisoning programs. Spray proponents focus inordinant attention on hypothesized economic scenarios that have little scope for other concerns. Economic approaches, while often practical, will always fall short of the mark.

NEWFOUNDLAND BIRD PROTECTION IN THE NINETEENTH CENTURY

On 23 April 1845 an "Act for the Protection of the Breeding of Wild Fowl in this Colony" was passed by Governor Sir Henry Harvey, the Council, and the Assembly in a legislative session in Newfoundland. This act came just 13 years after the British colony was granted representative government and was a very early, probably the first, piece of legislation for the protection of birds in what is now Canada (Foster, 1978). The act specified total protection, including the taking of eggs, during the breeding season from 10 May to 1 September for "the various species of Wild Fowl which resort to or frequent the shores, coasts, or other parts of the Island." The maximum fine of 20 pounds appears to have been harsh for that time.

On 20 April 1859 this act was repealed. A lengthier "Act for the Protection of the Breeding of Wild Fowl and Preservation of Game," spelled out in verbose, legal jargon the penalties "necessary to prevent the extermination of Wild Fowl of this colony." The 1859 act made it specifically illegal to take eggs from Funk Island and protected partridge (i.e., ptarmigan), snipe, and "wild or any migratory birds," excepting "wild geese" from 10 May to 10 August. The penalty for infractions was 10 shillings for *every* bird illegally taken or sold. The 1859 act, moreover, recognized the importance of birds in the diet of some residents, such that "Nothing in this Act shall extend or be construed to extend, to any poor Settler, who shall kill partridge, or any other Wild Fowl, for his own immediate consumption, or that of his family." The traditional right of poorer coastal settlers to procure birds for food, even in otherwise closed seasons, was upheld in one way or another for as long as Newfoundland remained a colony, and even after Newfoundland joined Canada in 1949 (see below). These more refined laws also exempted certain species, such as geese, from protection even during the nesting season. The act of 1859 was amended in 1863 to prohibit the use of guns on Sundays, a prohibition that is still in effect.

On 23 April 1869 an "Act to Amend and Consolidate the Game Laws" replaced former acts and set the following closed seasons; ptarmigan (25 January to 1 September), snipe, blackbirds, or any other "wild or migratory" birds, except geese (20 March to 20 August). The harvesting of eggs was prohibited completely.

A decade later an "Act to Amend and Consolidate the Law respecting the Preservation of Game and Other Animals" was passed and specified a closed season from 12 January to 1 September for ptarmigan, snipe, blackbirds, or

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any other wild bird, except geese or seafoal. As before, "poor settlers" were exempt from the act. The act also recognized that married women (who traditionally had few property rights) could be liable "for the penalty attaching to such breach, as if they were unmarried women or principals," although the fine or penalty imposed could be levied upon the property of the husband. It would be interesting to know what prompted this particular piece of legislation, and if it was ever enforced. This act also gave the constable or peace officer the legal right to "search any cart or other conveyance" for infractions of the game laws. The maximum penalty was now in dollars (\$25), rather than in pounds sterling.

An amendment on 19 May 1886 was mostly concerned with heavy penalties (up to \$200) for molesting black-game (Eurasian Black Grouse), which had recently been introduced from Scotland by Robert Langrish-More of St. John's. The closed season on willow grouse (i.e., ptarmigan) and other "wild or migratory" birds was from 12 January through 15 September, an extension of two weeks from the previous act. A further amendment in 1890 again shortened the protective season (12 January to 20 August) and specified curlew, plover, and snipe as well as other "wild or migratory" birds. Geese were still exempt. In 1892 the closed season for ptarmigan was put back to 12 January through 15 September, while the open season for snipe, curlew, plover, and other "wild or migratory" birds (except geese) and their eggs was not changed.

A concerned Newfoundland public soon made itself evident, taking stands on behalf of wildlife. In 1890 the Game Protection Society of Newfoundland was established and remained active for nine years. Thus, even in the 19th century, public interest in conservation was fostered and undoubtedly played its part in recommendations to the government on season lengths and other issues.

NEWFOUNDLAND BIRD PROTECTION IN THE TWENTIETH CENTURY

Early conservation initiatives were refined and intensified in the 20th century. Under the "Marine and Fisheries Amendment Act" of 1904, provision was made for the establishment of a Game Preservation and Inland Fisheries Board. Some of the board's duties included investigation of the preservation and enhancement of gamebirds in the colony. The board was actually implemented on 13 July 1909, when three supervisors were appointed to oversee the wardens in different districts. The board administered wildlife conservation until 1934, when Government by Commission was instituted, and the responsibility for gamebirds and other animals was transferred to the Department of Natural Resources.

In 1934 an open season (16 September to 14 January) was set for ptarmigan, ducks, geese, snipe, plover, and curlew. Hunting areas were also zoned for the first time (with different seasons), and bag limits established (12 ptarmigan, five ducks, two geese, ten snipe). In 1941 Newfoundland's first small

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game license (\$0.55 for residents) was issued. A season was established for ducks, geese, curlew, plover, and snipe from 1 September to 30 April. Gamebirds were not to be sold or purchased during closed seasons (seabirds, for instance, could not be sold from 1 May to 31 August), nor could anyone have in his possession or in cold-storage any ptarmigan or seabird during the closed seasons. Predatory hawks and crows specifically were not protected, and, as elsewhere, raptors were destroyed by hunters and farmers alike. It is only in recent decades that the beneficial effects of predators on the natural regulation and vigor of prey populations have been fully appreciated (Allen, 1954).

The first specific open season for seabirds was designated in 1943, when auks, murres, puffins, guillemots, kittiwakes, shearwaters, shellbirds (mergansers), loons, gulls, terns, cormorants, and eider ducks were legally hunted from 1 September to 31 May. The regulation on seabirds was the first to prohibit the hunting of Greater and Sooty Shearwaters in summer, when they are abundant in Newfoundland coastal waters. Shearwaters were a favored food item for many Newfoundlanders (Sclater, ca. 1920), and the song (see below) entitled "The Shooting of the Bawks" by A. R. Scammell (1940) so ridiculed the Commission of Government that the law was soon rescinded. The economic conditions and traditions alluded to in Scammell's poem also indicate the magnitude of the problems that run counter to conservation perspectives.

THE SHOOTING OF THE BAWKS

by

A. R. Scammell

The ones who made this law can sit, eat chicken, drink port wine,
But what about the poor old ghost who hauls a fishing line?
He has to watch the bawks flock round, upon a foggy day,
And watch them rob his trawls of bait, and watch them fly away;
He's not allowed to kill one, or someone sure will squawk,
For there's a bloody law agin' the killin' of a bawk.

No doubt our wise Commissioners will formulate a plan,
To furnish fresh meat for everyone who lives in Newfoundland.
They've got a million pounds I hear, from over cross the sea,
They'll want it all to feed the men who in the pen will be.
For Mary dear I'll kill a bird in August, June or May,
And if they put me in the pen, why there I'll have to stay,
For men with children underfed, would rather far be sued,
Then keep this bloody law that stops a man from getting food.

Now when the bawks stop flyin' and the noddies stay at home,
And the bosun and the puffin, no longer they do roam,
Then I will give up shootin' in the good old summer time,

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I'll take the breadbox, kettle, pot and leave the gun behind.
But till that day shall come my boys, I'm sure you will agree,
That birds that fly in summer time should nourish you and me.
Now bawks have got a fishy taste as everybody knows,
But they make a better diet boys, than either hawks or crows.

There's many men in summer time who cannot buy salt meat,
They have to trust to sea-birds for something fresh to eat,
But if they keep this law that's passed, they will not get a taste
Of bawk or noddie, tinker, tur, and not a tickleace.
So you who made this law prepare and send us all a meal
From time to time of good fresh beef, of mutton, pork and veal,
And don't forget my bully boys, a chicken now and then,
As yet there's neither law agin' the killin' of a hen!

Raptors and other "pests" were held in low esteem in the 1943 regulations, and crows, ravens, grackles, goshawks, Sharp-shinned Hawks, and Great Horned Owls had year-round open seasons. It was specified that there were no open seasons on Brant, swans, Wood Ducks, plovers, and curlews, as well as on all other birds not cited. The influence of United States advisors is apparent here, because Brant, swans, and Wood Ducks either did not occur or were of very rare occurrence in Newfoundland.

In 1948 there was no open season on ptarmigan and snipe, whereas geese, yellowlegs, and ducks (other than Wood Ducks) were zoned with a 15 September to 31 October open season. The seabird season remained unchanged, and there was a year-round open season on shearwaters, crows, ravens, grackles, hawks, cormorants, mergansers, loons, and Great Horned Owls. Note the removal of shearwaters, cormorants, mergansers, and loons from the seabird category, and their inclusion with "pest" species. The resident license fee for small game was now \$1, and bag limits were five ducks and two geese per trip, with respective seasonal limits of 30 and 12. The sale or purchase of ptarmigan was forbidden. Other wild birds for which a season was provided could be sold, purchased, or put in storage during the period from seven days after the start and until seven days after the close of the hunting season.

The biggest change in conservation legislation came in 1949, when Newfoundland joined Canada and the international Migratory Birds Convention Act came into effect. From then on provincial game laws only regulated the seasons on grouse and other nonmigratory species, such as the raptors, not covered by the federal treaty. For instance, in 1970 (amendment to 1959 law) provincial regulations protected the eagles, Osprey, Peregrine Falcon, Gyrfalcon, Sharp-shinned Hawk, Rough-legged Hawk, Red-tailed Hawk, Northern Harrier, American Kestrel, and Merlin year-round.

Recent provincial regulations have been concerned with seasonal rather than bag limits on ptarmigan, and in some years additional short winter seasons have been opened. There is controversy among wildlife biologists and

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hunters as to the pros and cons of winter hunts, and their impact on the ptarmigan population. These birds show cyclic population fluctuations, and it has been argued that heavy harvests in years of peak abundance are warranted since large numbers would otherwise die-off in the winter or early spring in any case. The matter is not, however, a closed issue.

Public organizations continued to protect wildlife and wilderness habitat in Newfoundland and Labrador. The Fish and Game Protection Association was established in 1927; and its goals included forest preservation, the establishment of wildlife sanctuaries, and salmon conservation (Muir, 1937). Other concerned groups followed: Grand Falls Fish and Game Association, the Newfoundland Sportsmen's Association, rod and gun clubs, the Natural History Society of Newfoundland and Labrador, the Salmon Association of Eastern Newfoundland, the Salmon Preservation Association of Western Newfoundland, the Newfoundland and Labrador Wildlife Federation, and, recently, the Wilderness Society.

MIGRATORY BIRDS CONVENTION TREATY (1916)

The Migratory Birds Treaty for the protection of species that moved between United States and Canada is one of the greatest achievements in wildlife conservation in the world and is the envy of many countries, especially in Europe. It was needed because many species of ducks, geese, and shorebirds, in particular, breed mainly in northern Canada and winter in the southern United States, and the waterfowl are hunted during autumn migration between these locations. It was understood by the designers of the treaty that the treatment of birds in one place greatly effects their abundance in distant locations, and that North American migratory birds were international concerns (Foster, 1978).

The treaty was also of massive consequence on national levels. With the signing of the international treaty, migratory birds became federal responsibilities, and the difficulties involved with developing agreements between self-interested provinces and states were thus avoided. Had this not been the case, large-scale legislation would have been greatly slowed, if not completely prevented (Solman, 1981). The treaty was signed in Washington on 16 August 1916 by His Majesty's Ambassador, Sir Cecil Springs-Rice, and the Secretary of State of the United States, Mr. Robert Lansing. The conditions of the treaty were ratified as the Migratory Birds Convention Act by the Canadian Parliament on 29 August 1917, and have been in force ever since. The first regulations under the Migratory Birds Convention Act was passed by Order in Council on 23 April 1918. The provisions of the treaty came into effect in Newfoundland and Labrador with entrance into Canadian Confederation in 1949. The federal government recognized the traditional winter seabird hunt in the province; exemption was granted for the only open winter season on Thick-billed and Common Murres in North America.

The most important provisions in the Migratory Birds Convention Act

provided for open and closed seasons on "gamebirds" and a permanent closed season on insectivorous birds and "migratory nongame birds." Newfoundland's migratory gamebirds are waterfowl (ducks, geese) and snipe. Non-migratory ptarmigan and introduced grouse are provincial responsibilities that do not fall under the act. In other parts of North America pigeons, doves, rails, and woodcock are important game species, but they do not occur in sufficient numbers in Newfoundland to warrant open seasons. Owing to the negative perception of predators in vogue during the early 20th century, the raptors (owls, hawks, eagles, and Ospreys) were not originally protected by the Migratory Birds Convention Act but they are now protected by provincial and state laws. In fact, the stand taken at present by the states and provinces, including Newfoundland, is that if there is no provision for an open season on any species, it is protected year-round.

Newfoundland was not a party to the Convention, and the application of the regulations caused some consternation and even hardship for some residents of small coastal communities. Auks, gulls, and shearwaters, and occasionally seabird eggs, were important sources of protein in many coastal settlements, as indeed they still are in some communities in Iceland, northern Norway, and on the Murmansk coast (Hyman, 1982).

Arguments for allowing the taking of seabirds and their eggs were raised by representatives of the Maritime Provinces and Northwest Territories during the initial enactment of the Migratory Birds Convention Treaty in Canada. The restrictions on the traditional use of such marine "resources" were difficult for Newfoundlanders to accept, particularly since such abundant species as the shearwaters from the South Atlantic and the sometimes nuisance species, such as Herring Gulls, also came under the treaty's blanket protection. The situation is now vastly different owing to economic improvement and to home refrigeration, both assuring a continuous supply of fresh meat. Murres and eider ducks are, however, still hunted intensively, and large numbers are harvested each season.

In 1966 the federal government began sales of Canada Migratory Game Bird Hunting Permits at a cost of \$2, later raised to \$3.50. In 1985 the fee was increased to \$7.50 to include the purchase of a new Wildlife Habitat Canada stamp. The monies obtained from these permits, which are required of all migratory Canadian gamebird hunters, except Inuits and Indians, help support annual wing surveys. Since 1966 random samples of hunters have been requested to forward a wing and other information from each gamebird taken. The results, when tabulated, provide indices for estimating hunting activity and success (National Harvest Survey), and the age and sex composition (Species Composition Survey) of the harvest in each province. A Biometrics Section of the Canadian Wildlife Service was established to design and implement hunter surveys and questionnaires, and to analyze the data returns. This information is then used in management decisions concerning bag limits and the timing and lengths of open seasons. The revenues from the sales of stamps go into the Wildlife Habitat Canada Foundation (see p. 223).

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MIGRATORY GAMEBIRD HARVEST

Since 1949 the Canadian government, at the suggestion of provincial wildlife managers, has zoned the hunting areas in Newfoundland. Daily bag and season limits have also been changed to satisfy hunter demands in response to an allowable national harvest. The average season is 94 days (ranging from 85–106 in different areas) for inland waterfowl (R. Elliot, pers. comm.). Seaducks, such as eiders and Oldsquaw, arrive later along the coast, and the season for these species, commencing on 23 November in some areas, may extend to 10 March, the latest date permitted under the Migratory Birds Convention Act.

The hunter returns used to calculate national waterfowl harvests have not always been reliable, and total harvest figures will not be tabulated here. Some Newfoundland problems include a poor response rate and among all the provinces the highest proportion of hunters who claim they did not hunt (B. Johnson, pers. comm.) or were unsuccessful (Wendt and Hyslop, 1980). The sale of Migratory Game Bird Permits has shown a steady increase in the province from 13,269 in 1966 to 35,490 in 1979, an increment of over 150%. During the same period the human resident population grew only 10%. The increase in licence sales may reflect present life trends in Newfoundland, i.e., less emigration and more leisure time, and the consequent "coming on stream" of a larger proportion of young people of hunter age. Part of the increase in sales, however, is due simply to the hunters becoming aware of the requirement to purchase the Migratory Birds Convention permit, and the enforcement of licensing regulations. Nevertheless, since 1979 permit sales have declined slightly, averaging approximately 30,000 purchased per annum, a decline that reflects a national Canadian trend (Metras, 1984, 1986).

Ptarmigan are the primary small game species hunted. During periods of cyclic population peaks the ptarmigan harvest can be quite high. In 1976, 25,000 small game (ptarmigan) licences were sold, and the estimated kill for the island was 214,000 birds (J. Folinsbee, pers. comm.). Small game licence returns indicated that in most areas dabbling ducks and snipe serve as compensatory species, i.e., most hunters try for these species only on returning from ptarmigan hunts (Inder and Gillespie, 1974). These birds are also hunted more intensively during low points in ptarmigan population cycles (Inder and Gillespie, 1974). It was estimated that 16,875 to 19,043 snipe were harvested yearly from 1977 to 1979 (Wendt and Hyslop, 1980). Ruffed Grouse also serve as compensatory game and are hunted fairly intensively; their numbers and distribution have increased markedly in recent years. Spruce Grouse are taken in very small numbers.

From 1982 to 1985 it was estimated that approximately 114,000 ducks and 13,000 geese were harvested yearly in Newfoundland (Metras, 1986). Eider ducks and Oldsquaw are the most abundant and heavily hunted seaducks; scoters are also taken, though estimates of their annual harvests are imprecise.

The American Black Duck (an estimated 23,000 annually, 1982–85) and Green-winged Teal (an estimated 13,000 to 30,832 annually, 1982–85) are the most heavily hunted dabbling ducks in Newfoundland (Metras, 1986). The Ring-necked Duck, a relative newcomer to the island, is also abundant; many thousands are shot each year. Common and Red-breasted Mergansers are not particularly popular gamebirds, though thousands are taken each season (Wendt and Hyslop, 1980; Metras, 1986). The Blue-winged Teal and Pintail have become more prevalent in the hunter's bag lately. The annual estimated harvest of Canada Geese in Newfoundland averaged approximately 13,000 yearly from 1982 to 1985 (Wendt and Hyslop, 1980; Metras, 1986).

Absolute harvest figures are very difficult to estimate with present methods. Moreover, the methods appear to widely overestimate the harvests of rare species (e.g., Hooded Mergansers). For instance, in 1984 it was estimated that 129 Gadwall and 113 Redheads were shot in Newfoundland (Metras, 1986). The former is a bird very rarely sighted in the province, only being confirmed in 1984, and there are only two confirmed sightings of Redheads as of 1987. However, it seems likely that more than 50,000 pond ducks and more than 100,000 seaducks are shot each year in Newfoundland.

MURRE HUNTING REGULATIONS AND HARVEST

The hunting of murre, especially the more abundant Thick-billed Murre which migrates from the Canadian Arctic and Greenland, is the best example of the former traditional dependence of coastal Newfoundland residents on seabirds for fresh meat, particularly in winter. Not only were murre a dietary staple in many coastal communities, but before the Migratory Bird Convention Act was applied to Newfoundland the canning of birds was a minor industry. This tradition was particularly important on the northeast coast where ducks, except eiders, and geese, for which seasons are provided under the Migratory Birds Regulations, were scarce or absent. The winter murre hunt also took on a significance that was greater than the necessity that it filled; the hunt became an annual high point of adventure and sport.

In 1949 objections to the *new* Canadian regulations were prompt and vociferous, with understandably political overtones. In due time their impact was felt, and by 1958 the Migratory Birds Regulations were amended so that, with certain restrictions, rural Newfoundlanders could once again hunt murre for food from 1 September to 31 March, provided that none was sold or shipped elsewhere. This amendment was criticized because murre could be hunted only in rural areas and because hunters had to be "in need." The latter restriction, suggestive of poverty or at least welfare, was as unpopular as the previous total protection. Moreover, both restrictions were practically impossible to enforce. In 1969 the regulations affecting the taking of murre for food in Newfoundland were amended such that it became legal for any resident to shoot murre for food, but sales were still outlawed.

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The annual harvest of murres around 1950 was estimated to be approximately 200,000 birds, although by 1959 it was estimated to have dropped to less than 100,000 (L. M. Tuck, 1961). In 1960, the only year in which murres were included on the small game licence return, a provincial survey estimated the total harvest was 82,000 (Inder and Gillespie, 1974). Murres are the dominant bird hunted in Newfoundland. Present estimates indicate that up to 500,000 are shot annually in Newfoundland waters (Wendt and Cooch, 1984; A. Gaston, pers. comm.). If the harvests are actually of this magnitude, this cause of mortality, along with the others to which murres are subject, may be at or above the limit that the western North Atlantic population can sustain.

Because murres are not classified as migratory gamebirds in the Migratory Birds Convention Act, the regulations affecting waterfowl do not apply to them. There is no daily or seasonal limit on the number taken and, unlike waterfowl, they can be shot from power boats. A hunting permit is not even required. To say the least, these are very unusual circumstances and inappropriate conservation practices. Common sense dictates that the murre season should at least coincide with the seaduck season in Newfoundland. Furthermore, as pointed out earlier (L. M. Tuck, 1961), most adult birds return to the vicinity of their colonies several months before they begin to breed, and there should be a 30 km protection zone encircling each colony within which hunting would be curtailed by 15 February. This would pose no hardship for residents, because murres overwinter off all coasts. The major localities affected would be Cape St. Mary's, the Witless Bay Islands, Baccalieu Island, the Wadham, Penguin, and Cabot Islands, and Groswater Bay in Labrador. Funk Island is so far offshore, and in such treacherous waters, that it is unlikely hunters go there for the express purpose of shooting murres.

It is unrealistic to hunt murres or any species without bag limits. The murre hunt in Newfoundland is the only legally unregulated hunt, except for "pest" species, in the whole of the developed world. As history has shown, even the "infinitely abundant" species, such as the Great Auk and Passenger Pigeon, are often extremely vulnerable to extinction. Furthermore, the lack of bag limits tends to "devalue" the murres, making them seem unimportant in the eyes of government agencies and also making them less valued items to hunters who shoot them. It is essential to learn more about the number of murres that occur in Newfoundland waters in winter, and about the number that are shot or die from other causes each year, so that careful management considerations regarding this important species can be developed.

GAMEBIRD INTRODUCTIONS

Ambitious and well-intentioned sport hunters have frequently gone to great lengths to introduce "game" to areas where they are not native. In Newfoundland the many failures include capercallie, black grouse, and Ring-necked and Golden Pheasants (see, also, Bump, 1963). There have also been some successes, most notably Ruffed and Spruce Grouse (see p. 206).

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NATIONAL PARKS

There was a strong interest in the exploitation of North America's natural resources in the late 19th and early 20th centuries, and government concern for wilderness and wildlife preservation developed slowly. The world's first national park, Yellowstone National Park, was established in the United States in 1872. Canada soon followed with Banff National Park in 1885. These parks were strongly supported by railroad interests that were promoting westward travel on the newly-completed transcontinental railways (Foster, 1978). Recreation still figures prominently in the designs of most national (and provincial) parks, though environmental conservation and education now have the highest priority. Park officials are often pressured by governmental and private-interest groups to incorporate economic developments. Such short-term interests run counter to park philosophy to provide public access to relatively unmanipulated natural settings. Information on the national and provincial parks, wilderness areas, and wildlife sanctuaries in Newfoundland is presented in Appendix III.

PRESERVATION OF WILDERNESS HABITAT

The voluminous writings of conservationists can be distilled to one exceedingly clear underlying premise, viz., that wildlife conservation is a direct consequence of land conservation and the preservation of natural, undisturbed ecosystems and habitats (Allen, 1954; Leopold, 1966; McCoy, 1970). Unpolluted soil, water, and air are the basic denominators. Threats to the integrity of these life-sustaining environmental components are blatantly evident in many private and governmental practices, e.g., industrial pollution and waste, the establishment of agricultural and forestry monocultures, and the consequent massive applications of toxic insecticides and herbicides needed to maintain the artificial monocultures. Habitat conservation is an important and current governmental concern, and recent major initiatives by the government of Newfoundland and of Canada are briefly reviewed here.

Wilderness and Ecological Reserves Act (1980) of Newfoundland and Labrador.—The material presented throughout this book shows that Newfoundlanders are richly endowed with wilderness and wildlife. Most of this good fortune is simply a consequence of low human population density. Much more is now needed to protect this wilderness heritage. Long-term planning and development programs are required to address conservation and preservation issues squarely and continually. Concerned individuals, and private, public, and governmental organizations that embrace such ideals have their work cut out.

With the passage of the Wilderness and Ecological Reserves Act in 1980, the government of Newfoundland and Labrador put into place a powerful legislative tool designed to set aside reserves in ecologically distinct and in wild regions of the province. This foresightful bill provides a means with which to preserve the province's finest environmental treasures.

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Wildlife Habitat Canada Foundation (1984).—Federal commitment to the preservation of wilderness habitat was clearly emphasized in the creation of the Wildlife Habitat Canada Foundation on 20 February 1984 (Caccia, 1984). The Foundation, which will be supported by revenue generated from the sales of Wildlife Habitat Canada stamps in conjunction with Migratory Game Bird Hunting Permits, is a governmental response to the concerns of citizen and naturalist groups about the alarming destruction of Canada's wilderness. The Foundation's objectives to coordinate and facilitate the efforts of private naturalist, hunting, and fishing organizations directed at habitat protection are: 1. to promote the conservation, restoration, and enhancement of wildlife habitat in order to retain the diversity, distribution, and abundance of wildlife; 2. to provide a funding mechanism for the conservation, restoration, and enhancement of wildlife habitat in Canada; and 3. to foster coordination and leadership in the conservation, restoration, and enhancement of wildlife habitat in Canada.

Wetlands are of special concern, because marshes, swamps, and bogs, which provide crucial breeding and feeding habitat for waterfowl and other migratory birds, as well as for fish, are being destroyed at ever-accelerating rates by dyking, filling, draining, and dredging for purposes of urban, agricultural, and industrial expansion. Across North America, wetlands have usually been viewed as wastelands, even though they are among the most productive ecosystems in the world (Teal and Teal, 1969). Wetlands also reduce erosion and often lessen the severity of flooding by temporarily retaining increased water levels.

These governmental initiatives to preserve wilderness and wildlife habitat are ecologically important, and also influence public perceptions. Public attitude surveys reveal that most people feel that wildlife (game and nongame species) are not as abundant as they should be. When asked what they think would be the best means of increasing wildlife abundance, most people favor reducing hunting seasons, imposing bag limits, designating no hunting areas, etc., but very few are aware of the critical roles that habitat destruction and



FIG. 39. Great Auk skull recovered from Funk Island by the Grampus Expedition 1887 (drawn by J. Zickefoose).

CONSERVATION AND PRESERVATION

degradation play in keeping wildlife populations low (B. Hill, pers. comm.).

Legislative initiatives that value wilderness for its own sake are needed. Distinctions between consumptive and nonconsumptive wildlife uses have faded. Owing to their basis in human self-interest, all wildlife uses are best considered consumptive. Even "nature lovers" frequently destroy the wilderness they seek to preserve. Evaluations of "wildlife resources" in terms of human needs will not be sufficient to insure the preservation of the remnants of the North American wilderness and wildlife domain (Nash, 1967; Livingston, 1981). The alternatives are clear (see Fig. 39).

APPENDIX I

LIST OF NEWFOUNDLAND BIRDS

As of 5 July 1987, 332 species (excluding extinct species) and two European subspecies have been documented to occur in insular Newfoundland, and another nine species are listed hypothetically (Maunder, *et al.*, 1986). In this appendix these species are classified according to the following scheme:

- Breeding Resident: breeds and occurs year-round, although some portion of the population may migrate.
- Breeding Migrant: migrates from Newfoundland after the breeding season.
- Migrant: occurs in spring and fall and, at times, in summer and winter during passage to and from breeding and wintering areas.
- Winter Resident: occurs primarily in winter.
- Vagrant: occurs erratically in Newfoundland, which lies outside the species' usual range.
- Hypothetical: convincingly reported but lacking sufficient details for full acceptance.

BREEDING RESIDENTS

Red-throated Loon, <i>Gavia stellata</i>	Sharp-shinned Hawk, <i>Accipiter striatus</i>
Common Loon, <i>Gavis immer</i>	Northern Goshawk, <i>Accipiter gentilis</i>
Northern Fulmar, <i>Fulmarus glacialis</i>	Ring-necked Pheasant, <i>Phasianus colchicus</i> (introduced, very low numbers)
Leach's Storm-Petrel, <i>Oceanodroma leucorhoa</i>	Spruce Grouse, <i>Dendragapus canadensis</i> (introduced)
Great Cormorant, <i>Phalacrocorax carbo</i>	Willow Ptarmigan, <i>Lagopus lagopus</i>
Greater Scaup, <i>Aythya marila</i>	Rock Ptarmigan, <i>Lagopus mutus</i>
Common Eider, <i>Somateria mollissima</i>	Ruffed Grouse, <i>Bonasa umbellus</i> (introduced)
Harlequin Duck, <i>Histrionicus histrionicus</i>	Herring Gull, <i>Larus argentatus</i>
Common Goldeneye, <i>Bucephala clangula</i>	Great Black-backed Gull, <i>Larus marinus</i>
Common Merganser, <i>Mergus merganser</i>	Black-legged Kittiwake, <i>Rissa tridactyla</i>
Red-breasted Merganser, <i>Mergus serrator</i>	Common Murre, <i>Uria aalge</i>
Bald Eagle, <i>Haliaeetus leucocephalus</i>	

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Thick-billed Murre, <i>Uria lomvia</i>	<i>atricapillus</i>
Black Guillemot, <i>Cepphus grylle</i>	Boreal Chickadee, <i>Parus hudsonicus</i>
Rock Dove, <i>Columba livia</i>	Red-breasted Nuthatch, <i>Sitta</i>
Great Horned Owl, <i>Bubo virginianus</i>	<i>canadensis</i>
Northern Hawk-Owl, <i>Surnia ulula</i>	Brown Creeper, <i>Certhia americana</i>
Boreal Owl, <i>Aegolius funereus</i>	Golden-crowned Kinglet, <i>Regulus</i>
Belted Kingfisher, <i>Ceryle alcyon</i>	<i>satrapa</i>
Downy Woodpecker, <i>Picoides</i>	European Starling, <i>Sturnus vulgaris</i>
<i>pubescens</i>	Dark-eyed Junco, <i>Junco hyemalis</i>
Hairy Woodpecker, <i>Picoides villosus</i>	Common Grackle, <i>Quiscalus quiscula</i>
Three-toed Woodpecker, <i>Picoides</i>	Pine Grosbeak, <i>Pinicola enucleator</i>
<i>tridactylus</i>	Purple Finch, <i>Carpodacus purpureus</i>
Black-backed Woodpecker, <i>Picoides</i>	Red Crossbill, <i>Loxia curvirostra</i>
<i>arcticus</i>	White-winged Crossbill, <i>Loxia</i>
Gray Jay, <i>Perisoreus canadensis</i>	<i>leucoptera</i>
Blue Jay, <i>Cyanocitta cristata</i>	Common Redpoll, <i>Carduelis flammea</i>
American Crow, <i>Corvus</i>	Pine Siskin, <i>Carduelis pinus</i>
<i>brachyrhynchos</i>	Evening Grosbeak, <i>Coccothraustes</i>
Common Raven, <i>Corvus corax</i>	<i>vespertinus</i>
Black-capped Chickadee, <i>Parus</i>	House Sparrow, <i>Passer domesticus</i>

BREEDING MIGRANTS

Manx Shearwater, <i>Puffinus puffinus</i>	Sora, <i>Porzana carolina</i>
Northern Gannet, <i>Sula bassanus</i>	Semipalmated Plover, <i>Charadrius</i>
Double-crested Cormorant,	<i>semipalmatus</i>
<i>Phalacrocorax auritus</i>	Piping Plover, <i>Charadrius melodius</i>
American Bittern, <i>Botarus</i>	Killdeer, <i>Charadrius vociferus</i>
<i>lentiginosus</i>	Greater Yellowlegs, <i>Tringa</i>
Canada Goose, <i>Branta canadensis</i>	<i>melanoleuca</i>
Green-winged Teal, <i>Anas crecca</i>	Willet, <i>Catoptrophorus semipalmatus</i>
American Black Duck, <i>Anas rubripes</i>	Spotted Sandpiper, <i>Actitis macularia</i>
Mallard, <i>Anas platyrhynchos</i>	Least Sandpiper, <i>Calidris minutilla</i>
Northern Pintail, <i>Anas acuta</i>	Common Snipe, <i>Gallinago gallinago</i>
Blue-winged Teal, <i>Anas discors</i>	American Woodcock, <i>Scolopax minor</i>
American Wigeon, <i>Anas americana</i>	Common Black-headed Gull, <i>Larus</i>
Ring-necked Duck, <i>Aythya collaris</i>	<i>ridibundus</i>
Osprey, <i>Pandion haliaetus</i>	Ring-billed Gull, <i>Larus delawarensis</i>
Northern Harrier, <i>Circus cyaneus</i>	Caspian Tern, <i>Sterna caspia</i>
Rough-legged Hawk, <i>Buteo lagopus</i>	Common Tern, <i>Sterna hirundo</i>
American Kestrel, <i>Falco sparverius</i>	Arctic Tern, <i>Sterna paradisaea</i>
Merlin, <i>Falco columbarius</i>	Razorbill, <i>Alca torda</i>
Virginia Rail, <i>Rallus limicola</i>	Atlantic Puffin, <i>Fratercula arctica</i>

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- Short-eared Owl, *Asio flammeus*
 Ruby-throated Hummingbird, *Archilochus colubris*
 Yellow-bellied Sapsucker, *Sphyrapicus varius*
 Northern Flicker, *Colaptes auratus*
 Olive-sided Flycatcher, *Contopus borealis*
 Yellow-bellied Flycatcher, *Empidonax flaviventris*
 Alder Flycatcher, *Empidonax alnorum*
 Least Flycatcher, *Empidonax minimus*
 Eastern Kingbird, *Tyrannus tyrannus*
 Horned Lark, *Eremophila alpestris*
 Tree Swallow, *Tachycineta bicolor*
 Bank Swallow, *Riparia riparia*
 Barn Swallow, *Hirundo rustica*
 Winter Wren, *Troglodytes troglodytes*
 Ruby-crowned Kinglet, *Regulus regulus*
 Veery, *Catharus fuscescens*
 Gray-cheeked Thrush, *Catharus minimus*
 Swainson's Thrush, *Catharus ustulatus*
 Hermit Thrush, *Catharus guttatus*
 American Robin, *Turdus migratorius*
 Northern Mockingbird, *Mimus polyglottos*
 Water Pipit, *Anthus spinoletta*
 Cedar Waxwing, *Bombycilla cedrorum*
 Solitary Vireo, *Vireo solitarius*
 Red-eyed Vireo, *Vireo olivaceus*
 Tennessee Warbler, *Vermivora peregrina*
 Nashville Warbler, *Vermivora ruficapilla*
 Northern Parula, *Parula americana*
 Yellow Warbler, *Dendroica petechia*
 Magnolia Warbler, *Dendroica magnolia*
 Cape May Warbler, *Dendroica tigrina*
 Yellow-rumped Warbler, *Dendroica coronata*
 Black-throated Green Warbler, *Dendroica virens*
 Blackburnian Warbler, *Dendroica fusca*
 Palm Warbler, *Dendroica palmarum*
 Bay-breasted Warbler, *Dendroica castanea*
 Blackpoll Warbler, *Dendroica striata*
 Black-and-white Warbler, *Mniotilta varia*
 American Redstart, *Setophaga ruticilla*
 Ovenbird, *Seiurus aurocapillus*
 Northern Waterthrush, *Seiurus noveboracensis*
 Mourning Warbler, *Oporornis philadelphia*
 Common Yellowthroat, *Geothlypis trichas*
 Wilson's Warbler, *Wilsonia pusilla*
 Rose-breasted Grosbeak, *Phœucticus ludovicianus*
 American Tree Sparrow, *Spizella arborea*
 Chipping Sparrow, *Spizella passerina*
 Savannah Sparrow, *Passerculus sandwichensis*
 Fox Sparrow, *Passerella iliaca*
 Song Sparrow, *Melospiza melodia*
 Lincoln's Sparrow, *Melospiza lincolnii*
 Swamp Sparrow, *Melospiza georgiana*
 White-throated Sparrow, *Zonotrichia albicollis*
 White-crowned Sparrow, *Zonotrichia leucophrys*
 Bobolink, *Dolichonyx oryzivorus*
 Red-winged Blackbird, *Agelaius phoeniceus*
 Rusty Blackbird, *Euphagus carolinus*
 Brown-headed Cowbird, *Molothrus ater*
 American Goldfinch, *Carduelis tristis*

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MIGRANTS

Wilson's Storm-Petrel, <i>Oceanites oceanicus</i>	<i>griseus</i>
Cory's Shearwater, <i>Calonectris diomedea</i>	Red-necked Phalarope, <i>Phalaropus lobatus</i>
Greater Shearwater, <i>Puffinus gravis</i> (summer resident)	Red Phalarope, <i>Phalaropus fulicaria</i>
Sooty Shearwater, <i>Puffinus griseus</i> (summer resident)	Pomarine Jaeger, <i>Stercorarius pomarinus</i>
Great Blue Heron, <i>Ardea herodias</i>	Parasitic Jaeger, <i>Stercorarius parasiticus</i>
Wood Duck, <i>Aix sponsa</i>	Long-tailed Jaeger, <i>Stercorarius longicaudus</i>
Peregrine Falcon, <i>Falco peregrinus</i>	Great Skua, <i>Catharacta skua</i>
Gyr Falcon, <i>Falco rusticolus</i>	South Polar Skua, <i>Catharacta maccormicki</i>
American Coot, <i>Fulica americana</i>	Bonaparte's Gull, <i>Larus philadelphia</i>
Black-bellied Plover, <i>Pluvialis squatarola</i>	Ivory Gull, <i>Pagophila eburnea</i>
Lesser Golden Plover, <i>Pluvialis dominica</i>	Mourning Dove, <i>Zenaida macroura</i>
Lesser Yellowlegs, <i>Tringa flavipes</i>	Northern Saw-whet Owl, <i>Aegolius acadicus</i> (may breed)
Solitary Sandpiper, <i>Tringa solitaria</i>	Common Nighthawk, <i>Chordeiles minor</i>
Whimbrel, <i>Numenius phaeopus</i>	Chimney Swift, <i>Chaetura pelagica</i>
Hudsonian Godwit, <i>Limosa haemastica</i>	Cliff Swallow, <i>Hirundo pyrrhonota</i>
Ruddy Turnstone, <i>Arenaria interpres</i>	Northern Wheatear, <i>Oenanthe oenanthe</i> (nests in Labrador)
Red Knot, <i>Calidris canutus</i>	Gray Catbird, <i>Dumetella carolinensis</i>
Sanderling, <i>Calidris alba</i>	Northern Shrike, <i>Lanius excubitor</i>
Semipalmated Sandpiper, <i>Calidris pusilla</i>	Philadelphia Vireo, <i>Vireo philadelphicus</i>
White-rumped Sandpiper, <i>Calidris fuscicollis</i>	Orange-crowned Warbler, <i>Vermivora chrysoptera</i>
Baird's Sandpiper, <i>Calidris bairdii</i>	Canada Warbler, <i>Wilsonia canadensis</i>
Pectoral Sandpiper, <i>Calidris melanotos</i>	Dickcissel, <i>Spiza americana</i>
Dunlin, <i>Calidris alpina</i>	Lapland Longspur, <i>Calcarius lapponicus</i>
Buff-breasted Sandpiper, <i>Tryngites subruficollis</i>	Northern Oriole, <i>Icterus galbula</i>
Short-billed Dowitcher, <i>Limnodromus</i>	Hoary Redpoll, <i>Carduelis hornemanni</i>

WINTER RESIDENTS

Pied-billed Grebe, <i>Podilymbus podiceps</i>	King Eider, <i>Somateria spectabilis</i>
Horned Grebe, <i>Podiceps auritus</i>	Oldsquaw, <i>Clangula hyemalis</i>
Red-necked Grebe, <i>Podiceps grisegena</i>	Black Scoter, <i>Melanitta nigra</i>
	Surf Scoter, <i>Melanitta perspicillata</i>
	White-winged Scoter, <i>Melanitta fusca</i>

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Barrow's Goldeneye, *Bucephala islandica*
 Bufflehead, *Bucephala albeola*
 Purple Sandpiper, *Calidris maritima*
 Iceland Gull, *Larus glaucoides*
 Glaucous Gull, *Larus hyperboreus*

Dovekie, *Alle alle*
 Snowy Owl, *Nyctea scandiaca*
 Bohemian Waxwing, *Bombycilla garrulus*
 Snow Bunting, *Plectrophenax nivalis*

VAGRANTS

Arctic Loon, *Gavia arctica*
 American White Pelecan, *Pelecanus erythrorhynchos*
 Magnificent Frigatebird, *Fregata magnificens*
 Least Bittern, *Ixobrychus exilis*
 Great Egret, *Casmerodius albus*
 Little Egret, *Egretta garzetta*
 Snowy Egret, *Egretta thula*
 Little Blue Heron, *Egretta caerulea*
 Tricolored Heron, *Egretta tricolor*
 Cattle Egret, *Bubulcus ibis*
 Green-backed Heron, *Butorides striatus*
 Black-crowned Night-Heron, *Nycticorax nycticorax*
 Yellow-crowned Night-Heron, *Nycticorax violaceus*
 White Ibis, *Eudocimus albus*
 Glossy Ibis, *Eudocimus ruber*
 Greater Flamingo, *Phoenicopterus ruber*
 Tundra Swan, *Cygnus columbianus*
 Pink-footed Goose, *Anser brachyrhynchus*
 Greater White-fronted Goose, *Anser albifrons*
 Snow Goose, *Chen caerulescens*
 Brant, *Branta bernicla*
 Barnacle Goose, *Branta leucopsis*
 European Green-winged Teal, *Anas crecca crecca* (subspecies)
 Northern Shoveler, *Anas clypeata*
 Gadwall, *Anas strepera*
 Eurasian Wigeon, *Anas penelope*
 Canvasback, *Aythya valisineria*

Redhead, *Aythya americana*
 Tufted Duck, *Aythya fuligula*
 Lesser Scaup, *Aythya affinis*
 Hooded Merganser, *Lophodytes cucullatus*
 Ruddy Duck, *Oxyura jamaicensis*
 Turkey Vulture, *Cathartes aura*
 Cooper's Hawk, *Accipiter cooperii*
 Red-tailed Hawk, *Buteo jamaicensis*
 Golden Eagle, *Aquila chrysaetos*
 Corn Crane, *Crex crex*
 Clapper Rail, *Rallus longirostris*
 King Rail, *Rallus elegans*
 Purple Gallinule, *Porphyryla martinica*
 Common Moorhen, *Gallinula chloropus*
 Eurasian Coot, *Fulica atra*
 Sandhill Crane, *Grus canadensis*
 Northern Lapwing, *Vanellus vanellus*
 Greater Golden Plover, *Pluvialis apricaria*
 Common Ringed Plover, *Pluvialis hiaticula*
 Black-necked Stilt, *Himantopus mexicanus*
 Common Greenshank, *Tringa nebularia*
 Spotted Redshank, *Tringa erythropus*
 Upland Sandpiper, *Bartarmia longicauda*
 European Whimbrel, *Numenius phaeopus phaeopus* (subspecies)
 Black-tailed Godwit, *Limosa limosa*
 Bar-tailed Godwit, *Limosa laponica*
 Marbled Godwit, *Limosa fedoa*

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Curlew Sandpiper, <i>Calidris ferruginea</i>	Townsend's Solitaire, <i>Myadestes townsendi</i>
Stilt Sandpiper, <i>Calidris himantopus</i>	Fieldfare, <i>Turdus pilaris</i>
Ruff, <i>Philomachus pugnax</i>	Redwing, <i>Turdus iliacus</i>
Eurasian Woodcock, <i>Scolopax rusticola</i>	Brown Thrasher, <i>Toxostoma rufum</i>
Wilson's Phalarope, <i>Phalaropus tricolor</i>	Warbling Vireo, <i>Vireo gilvus</i>
Laughing Gull, <i>Larus atricilla</i>	Blue-winged Warbler, <i>Vermivora pinus</i>
Franklin's Gull, <i>Larus pipixcan</i>	Chestnut-sided Warbler, <i>Dendroica pensylvanica</i>
Little Gull, <i>Larus minutus</i>	Black-throated Blue Warbler, <i>Dendroica caerulescens</i>
Mew Gull, <i>Larus canus</i>	Townsend's Warbler, <i>Dendroica townsendi</i>
Thayer's Gull, <i>Larus thayeri</i>	Yellow-throated Warbler, <i>Dendroica dominica</i>
Lesser Black-backed Gull, <i>Larus fuscus</i>	Pine Warbler, <i>Dendroica pinus</i>
Ross' Gull, <i>Rhodostethia rosea</i>	Prairie Warbler, <i>Dendroica discolor</i>
Sabine's Gull, <i>Xema sabini</i>	Prothonotary Warbler, <i>Protonotaria citrea</i>
Royal Tern, <i>Sterna maxima</i>	Kentucky Warbler, <i>Oporornis formosus</i>
Forster's Tern, <i>Sterna forsteri</i>	Hooded Warbler, <i>Wilsonia citrina</i>
Bridled Tern, <i>Sterna anaethetus</i>	Yellow-breasted Chat, <i>Icteria virens</i>
Black Tern, <i>Chlidonias niger</i>	Summer Tanager, <i>Piranga rubra</i>
Black Skimmer, <i>Rynchops niger</i>	Scarlet Tanager, <i>Piranga olivacea</i>
Black-billed Cuckoo, <i>Coccyzus erythrophthalmus</i>	Northern Cardinal, <i>Cardinalis cardinalis</i>
Yellow-billed Cuckoo, <i>Coccyzus americanus</i>	Blue Grosbeak, <i>Cyanocompsa parellina</i>
Common Barn-Owl, <i>Tyto alba</i>	Indigo Bunting, <i>Passerina cyanea</i>
Rufous Hummingbird, <i>Selasphorus rufus</i>	Rufous-sided Towhee, <i>Pipilo erythrophthalmus</i>
Lewis' Woodpecker, <i>Melanerpes lewis</i>	Clay-colored Sparrow, <i>Spizella pallida</i>
Eastern Wood-Pewee, <i>Contopus virens</i>	Field Sparrow, <i>Spizella pusilla</i>
Eastern Phoebe, <i>Sayornis phoebe</i>	Vesper Sparrow, <i>Pooecetes gramineus</i>
Great Crested Flycatcher, <i>Myiarchus crinitus</i>	Lark Sparrow, <i>Chondestes grammacus</i>
Western Kingbird, <i>Tyrannus verticalis</i>	Lark Bunting, <i>Calamospiza melanocorys</i>
Purple Martin, <i>Progne subis</i>	Grasshopper Sparrow, <i>Ammodramus savannarum</i>
Northern Rough-winged Swallow, <i>Stelgidopteryx serripennis</i>	Sharp-tailed Sparrow, <i>Ammodramus caudacutus</i>
Black-billed Magpie, <i>Pica pica</i>	
House Wren, <i>Troglodytes aedon</i>	
Blue-Gray Gnatcatcher, <i>Poliophtila caerulea</i>	

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Chestnut-collared Longspur,
Calcarius ornatus
Eastern Meadowlark, *Sturnella*
magna

Yellow-headed Blackbird,
Xanthocephalus xanthocephalus
Orchard Oriole, *Icterus spurius*
Common Chaffinch, *Fringilla coelebs*

HYPOTHETICAL

Yellow-nosed Albatross, *Diomedea*
chlororhynchos
Little Shearwater, *Puffinus assimilus*
Western Sandpiper, *Calidris mauri*
Roseate Tern, *Sterna dougallii*
Long-eared Owl, *Asio otus*
Pileated Woodpecker, *Dryocopus*

pileatus
Eastern Bluebird, *Sialia sialis*
Yellow-throated Vireo, *Vireo*
flavifrons
Brewer's Blackbird, *Euphagus*
cyaniceps

APPENDIX II

VERNACULAR BIRD NAMES OF NEWFOUNDLAND

by

W. A. Montevecchi and J. Wells

A rich heritage of local vernacularisms has developed in Newfoundland's coastal communities (Story et al., 1982), and this is no more colorfully evident than in the names applied to birds. Bird names vary greatly over time and region (Choate, 1973; DiBenedictis, 1983). Similarities among names from different geographic areas often reflect a common derivation from the homeland traditions of early settlers. Many such striking associations link Newfoundland with Great Britain.

As has been seen in many of the early accounts presented in Chapters 4, 5 and 6, numerous old, English bird names were brought to the New World by early explorers, fisherman, and immigrants. Many names also originated locally, in some cases being based on a species' resemblance to an Old World one. Most local names are derived from a species' physical (e.g., Whitehead Eagle), behavioral (e.g., Noddy), or vocal (e.g., Twillock) attributes (Table 22). A number of names have derived from habitat (e.g., Shoreyer) and prey preferences (e.g., Partridge Hawk), likenesses to other species (e.g., Sea Pigeon), locations (e.g., Baccalieu Bird), associations with seasons (e.g., Snow Bird), weather (e.g., Gale Bird), time of activity (e.g., Night Bird), and with other animals (e.g., Whale Bird), as well as from analogies with religious figures (e.g., Mother Carey's Chicks). All these avenues provide the material for avian vernaculars. Here we draw together what is known of local bird names that are now or have been formerly used in Newfoundland.

Our information has been drawn from local residents, early accounts, and from Townsend and Allen (1907), Townsend (1911), Sclater (ca. 1920), Austin (1932), Ewing (1937), Aldrich and Nutt (1939), Templeman (1945), Peters and Burleigh (1951b), McAtee (1957), L. M. Tuck (1967a), Lysaght (1971), Lamberton (1976a, 1976b), and Story, et al. (1982). Some of the names in McAtee (1957), which appear to be very obscure have not been included here. In the listing that follows, we have, wherever possible, cited the earliest authority who recorded the name in question. In many cases different authors give different spellings which refer to the same locally spoken name (Templeman, 1945). When the use of a particular name appears associated with a specific area, the location is given. Citations given as initials are WAM (W. A. Montevecchi), LMT (L. M. Tuck) and JW (J. Wells); these refer to personal observations. This compilation, which is arranged in taxonomic sequence might benefit those interested in identifying species mentioned in old accounts, as well as serve as a reference to names still used by many local residents.

APPENDIX II

TABLE 22. Occurrence of different types of referents used in the vernacular names.

REFERENT ¹	% OCCURRENCE (FREQUENCY)
Attributes:	
Physical	31 (124)
Behavioral	8 (32)
Vocal	10 (41)
Likeness to other species	16 (63)
Environmental associations with:	
Habitat	19 (75)
Prey (Food)	6 (22)
Location	4 (17)
Season	2 (9)
Weather	1 (5)
Other Species	1 (4)
Time of day	<1 (2)
Miscellaneous::	
Religious analogies	1 (4)
Taxonomic analogies	<1 (2)

¹Names listed in Appendix II were subjectively assigned to the most appropriate category. Many local names, such as White-winged Diver, involve a combination of categories (i.e. physical and behavioral characteristics in this case). Such names were assigned to a single category judged to be the most distinguishing at the species level. White-winged Diver was classified as a physical referent. It was not possible for us to classify all local names using this scheme, though this would probably be possible if the derivations of all names could be traced.

RED-THROATED LOON: Whobby (Banks; probably attributable to their awkwardness on land), Wobby (Whitbourne), Whabby (Anspach), Wabby (Peters and Burleigh), Wabble, Wobble (Story, et al.), Capderace or Cape Racer (from frequenting the area of Cape Race; Purchas, 1622, *in* McAtee), Carbrace (Sunnyside; J. Maunder; W. Rockwood).

COMMON LOON: Lew (Thomas), Loo (Reeks), Loon (Anspach), Spotted Loo, White-throated Loo (McAtee), Whobble (North Harbour; T. Dalton), Whobbler (Branch; JW), Whabby (may be restricted to winter or immature plumage, Lamberton; a more common name for Red-throated Loon).

PIED-BILLED GREBE: Spraw-foot, Hell-diver (Peters and Burleigh).

HORNED GREBE: Spraw-foot (Peters and Burleigh).

RED-NECKED GREBE: Spraw-foot (Peters and Burleigh), Key-foot (Burgeo; LMT), Fingernail Bird (Sunnyside; W. Rockwood), Piker (Placentia Bay; L. Harris), Spirit Bird (St. Joseph's; B. Furey), Winker (North Harbour; T. Dalton).

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NORTHERN FULMAR: Noddy (Yonge, 1663 *in* Story, et al.; from habit of nodding head or English slang for simpleton), Malleroker (Bonnycastle), John Down (McAtee).

GREATER SHEARWATER: Hagden, Haigdown, Hegdown (Yonge, 1670, *in* Story, et al.), Bauk, Bawk, White Bauk, Eggdown (Templeman), Baulk, Hagdown, Hag (Peters and Burleigh).

SOOTY SHEARWATER: Black Hagdown (Howley, 1883 *in* Story, et al.), Hag, Hagdown, Black Bauk (Bawk or Balk; Templeman), Black Haddown, Black Hag, Black Hagden, Black Hagdon, Eggdown (McAtee), Minister (L'Anse-aux-Meadows; Mactavish), Pilot Bird (Terrenceville; Phillips, *fide* Maunder).

WILSON'S STORM-PETREL: Mother Carey's Chicken (Thomas), Carey's Chick (Austin). Not usually distinguished from Leach's Storm-Petrel.

LEACH'S STORM-PETREL: Mother Carey's Chicken (Thomas), Mother Carey's Chick, Pall Carey (owing to dark coloration; Templeman), Carey's Chick, Carey Chicken (Peters and Burleigh), Carey (LMT), Mother Careys (Witless Bay; J. Maunder). These names may have been derived from the Latin *Mater Cara* referring to the Virgin Mary, patron saint of sailors, or from Mother Carew, an old witch supposed to be good at raising wind (Mctaggart, 1829, *in* McAtee).

NORTHERN GANNET: Gaunt (Gilbert), Gannet.

GREAT CORMORANT: Shag (Cartwright; refers to shaggy crest; Story, et al; also a misnomer from an Old World species applied to a similar, but different, New World species), Cormorant (Peters and Burleigh), Carboy (Bonavista Bay; B. Sturge), Toggle (Notre Dame Bay; L. Harris, Story, et al.).

DOUBLE-CRESTED CORMORANT: Shag (Cartwright), Cormorant (Peters and Burleigh), Shaig, Queen Bird (allusion to crest; McAtee).

AMERICAN BITTERN: Corker (Reeks), Caulker (McAtee; LMT; sonic from the notion that their thumping calls sound like noise made by one caulking the seams of a boat), Bittrin (Spaniard's Bay; J. Maunder).

SNOW GOOSE: White-Goose (Labrador; Cartwright), Wavy (Labrador; Townsend and Allen).

BRANT: Brent Goose (Reeks), Brant Goose (probably refers to this species; B. Mactavish).

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CANADA GOOSE: Bustard (Gilbert), Little Black-breasted Northerner (may refer to northern race; Reeks), Goose (Lamberton), Wild Goose (JW).

GREEN-WINGED TEAL: Teal (Banks), Teale (Whitbourne), Common Teal (McAtee), Teal Duck (J. Maunder), Wigeon, Pieduck (Southern Shore; F. Phillips, *fide* J. Maunder).

BLUE-WINGED TEAL: see above.

AMERICAN BLACK DUCK: Black Duck (Banks), Wild Duck (Ewing).

NORTHERN PINTAIL: Sea Pheasant (Bonnycastle), Long-tail Duck (Reeks), Wigeon (sometimes; B. Mactavish).

RING-NECKED DUCK: Ring-billed Diver (Story, et al.).

SCAUP: Spoonbill (Lake Melville; Labrador; F. Phillips, *fide* J. Maunder).

COMMON EIDER: Eider (Banks), Eider Duck (Cartwright; Anspach), Gam Drake (Latham, 1821, *in* McAtee), Sea Duck (Reeks), Shoreyer (from habit of frequenting and foraging along the shoreline), Laying Duck (where nesting locally), Eskimo Duck (Townsend and Allen), Shore Duck (McAtee; B. Mactavish; JW), Duck (Lamberton), Black Duck (females; JW), Big Salt-Water Duck, Gam-bird, Canvas-back (McAtee; LMT), Gammy Bird (from tendency to flock socially; Story, et al.), White Jackets and Brown Ducks (males and females or immatures; Placentia Bay), Duck (J. Maunder), Canvas Jacket (L. Harris), Ring-necked Duck, Sealbird (L'Anse-aux-Meadows; first winter drakes; B. Mactavish).

KING EIDER: King-Duck (Cartwright), King Bird (Reeks), Passing Duck (Townsend and Allen), King Drake (Ewing), Old King (McAtee), Bottle-nosed drake (J. Maunder), Sealbird (sometimes; B. Mactavish).

LABRADOR DUCK: Pied Duck (Cartwright), Pie Duck (from contrasting patches in plumage; Story, et al.), Pied Bird, Fool Bird (McAtee).

HARLEQUIN DUCK: Lords and Ladies (adult males and females; Banks), Jenny (female or immature; Reeks), Pie Bird (McAtee), Squeakers (Ramea; B. Mactavish).

OLDSQUAW: Hound (Whitbourne; at a distance calls from flocks resemble a pack of hounds), Winter Duck (Cartwright), Old Wife (Reeks), Cockawee (Stearns, 1884, *in* Story, et al.), Kakawi (Stuwitz; LMT), Squaw-duck (Lamberton).

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BLACK SCOTER: Black Diver (Cartwright), Little Black Diver (Reeks), Butter-bill Coot (Labrador; Townsend and Allen), Sleepy Diver (Stuwitz), Butter-nosed Diver (McAtee; LMT), Whistling Diver (McAtee), Diver (Lamberton).

SURF SCOTER: Bottle-nosed Diver (Cartwright), Bottle-nose Diver (BMT), Bald Coot, Black Diver, Bellarge, Pied Duck, Surf Duck (McAtee), Mobile Goats, Witless Bay Gammy Birds, Bay Bull Bottle Noses (Story, et al.).

WHITE-WINGED SCOTER: Brass-winged Diver (Cartwright), White-winged Diver (Reeks), Salt-water Duck, Velvet Duck, White-wing Diver (McAtee).

COMMON GOLDENEYE: Lady Bird (Howley, 1887, *in* Story, et al.), Pie Duck, (Ewing), Whistler, Whistle Diver (Townsend and Allen; from noise it makes when in flight; Sclater), Pied Duck, Pied Bird (Story, et al.), Pie Bird (McAtee).

BARROW'S GOLDENEYE: same as above; Black-and-white Diver (McAtee).

BUFFLEHEAD: Spirit (Edwards, 1743, *in* McAtee), Spirit Duck, Butter-ball (Reeks), Sprite (LMT), Spirit Bird (St. Mary's Bay; B. Furey).

HOODED MERGANSER: Piebird Shellbird, Piebird Shellduck (Lake Melville, Labrador; F. Phillips, *vide* J. Maunder).

COMMON MERGANSER: Gozzard (Cartwright; a variation of Goosander, of Norse origin, which means goose-duck; LMT), Gossard (Peters and Burleigh), Gosset (McAtee), Gosser (L'Anse-aux-Meadows; B. Mactavish), Fresh-water Shellbird (North Harbour; T. Dalton).

RED-BREASTED MERGANSER: Shell-Bird (Cartwright; probably from habit of feeding in shallow water or near mussel beds), Shelldrake (Townsend and Allen), Shell Duck (Peters and Burleigh), Shellduck (McAtee), Salt-Water Shellbird (North Harbour; T. Dalton).

OSPREY: Fish Hawk (Bonnycastle), Fishing Hawk, Grepe, *Aigle Pêcheur* (Fisher Eagle; McAtee), Eagle (Lysaght).

BALD EAGLE: Gripe (Whitbourne), White-tail Eagle (Cartwright), Sea Eagle (Bonnycastle), Eagle (Jukes), Grepe (Reeks), Whitehead Eagle (North Harbour; T. Dalton).

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NORTHERN HARRIER: Hen Harrier, Hen Hawk (Reeks).

SHARP-SHINNED HAWK: Hen Hawk, Chicken Hawk (B. Mactavish).

NORTHERN GOSHAWK: Hen Hawk (Peters and Burleigh), Partridge Hawk (Sclater; Labrador; Packard, 1892, *in* Story, et al.; LMT), Chick Hawk, Fowl Hawk (Lamberton), Goshawk (from Old English "goshafoc," meaning goose hawk; McAtee).

ROUGH-LEGGED HAWK: Black Hawk (Reeks), Harrat, Brown Hawk (Lamberton), Hassot Lopper (L'Anse-aux-Meadows, sometimes; B. Mactavish), Squalling Hawk (Labrador; Packard, 1891, *in* Story, et al.), Squealing Hawk (McAtee).

AMERICAN KESTREL: Cliff Hawk (?), *Mangeur de Poule* (Chicken eater?; McAtee).

MERLIN: Chicken Hawk (LMT).

GYRFALCON: White Hawk (Reeks), Gray Hawk (Lamberton), Ice Hawk (Fogo; J. Maunder; L'Anse-aux-Meadows; B. Mactavish), Winter Hawk, Hawk (L'Anse-aux-Meadows; B. Mactavish).

SPRUCE GROUSE: Large Spruce Bird, Spruce Game (Labrador; Cartwright), Hen and Dick (Labrador; McAtee), Fool Hen, Spruce Partridge (Labrador; Choppell, 1818, *in* Story, et al.).

RUFFED GROUSE: Grouse, Birch Partridge, French Hen (Labrador; Townsend and Allen).

WILLOW PTARMIGAN: Partridge (Caboto), Grouse (Cartwright), Heathcock (Anspach), Willow Grouse (Reeks), Browse Partridge (Labrador; Townsend and Allen), Willow Partridge, Ptarmigan (Peters and Burleigh), Paytrick (Story, *et al.*), White Partridge, Moor Cock (McAtee), Rocker (St. Anthony; perhaps owing to birds' habit of standing in the lee of rocks on the barrens; Laird), Brookers (Labrador; F. Phillips, *fide* J. Maunder).

ROCK PTARMIGAN: Ptarmigan (Cartwright), Mountain Partridge (Reeks), Partridge, Rock Partridge (Ewing), Rocker (Peters and Burleigh), Barreners (Labrador; F. Phillips, *fide* J. Maunder).

BLACK-BELLIED PLOVER: Grey Plover (Cartwright), Sand Plover (LMT; Labrador; Austin), Beach Plover (L'Anse-aux-Meadows; B. Mactavish).

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LESSER GOLDEN-PLOVER: Golden Plover (Banks), Ground Plover (LMT), Marsh Plover (L'Anse-aux-Meadows; B. Mactavish).

SEMIPALMATED PLOVER: Beach Bird, Ring Plover (Reeks), Little Ringneck (Ewing), Ringer (Lamberton), Redleg, Twillig (sonic; McAtee).

PIPING PLOVER: Beach Bird (McAtee).

GREATER YELLOWLEGS: Twillick or Twillock (Mason; from its call; Peters and Burleigh), Nansary, Auntsary (Cartwright), Tillet, Stone Snipe, Yellow-shank Sandpiper (Reeks), Tell Tale, Nancary (Stearns, 1884, *in* Story, et al.), Aunt Sal, Aunt Sarah (an allusion to loud calling; Story, et al.).

LESSER YELLOWLEGS.: Aunt Sary, Sander, Twillick (McAtee).

SPOTTED SANDPIPER: Beach Bird (Banks), Wagtail (Reeks), Beachy-bird (Peters and Burleigh), Sander, Tidewatcher (L'Anse-aux-Meadows; B. Mactavish), Alouette branle queue (Rocker tail lark; McAtee).

ESKIMO CURLEW: Curlew (Banks), Little Curlew, Dough-bird (Austin; McAtee), Marsh Curlew (L'Anse-aux-Meadows; B. Mactavish).

WHIMBREL: Curlew (Banks), Jack Curlew (Reeks), Mountain Curlew (McAtee).

HUDSONIAN GODWIT: Dotterel (Reeks).

MARbled GODWIT: same as preceding species.

RUDDY TURNSTONE: Fat Oxen (owing to its plumpness in fall; Reeks), Red Legs (Ewing).

RED KNOT: Gray Back, Robin Snipe (Reeks), Croucher (from its tendency to crouch; LMT), Black-cap, Coochee (McAtee).

SANDERLING: White Beachy Bird (L'Anse-aux-Meadows; B. Mactavish), Beach Bird, Beachy Bird (McAtee).

SEMIPALMATED SANDPIPER: Oxeye (Bonnycastle), Beachy Bird (McAtee; B. Mactavish).

LEAST SANDPIPER: Sand Peep, Beachy Bird (McAtee; B. Mactavish).

WHITE-RUMPED SANDPIPER: Beachy Bird (McAtee; B. Mactavish).

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PECTORAL SANDPIPER: Beachy Bird (McAtee).

PURPLE SANDPIPER: Big Beachy Bird (McAtee), Soldier (L'Anse-aux-Meadows; Mactavish).

COMMON SNIPE: Snipe (Peters and Burleigh), Snite (an old English name; LMT), Devil's Laughter (Story, et al.).

RED-NECKED PHALAROPE: Gale Bird (Reeks), Gill Bird (Peters and Burleigh), St. Peters (because they land on water), Poverty Bird (Placentia Bay; J. Maunder).

RED PHALAROPE: same as above; Whale Bird (owing to species association; LMT).

POMARINE JAEGER: Marlin Spike (LMT), Black Marling Spike (dark phase; Allen, 1879), Sea Hen (L'Anse-aux-Meadows; B. Mactavish), Sane (perhaps a combination of Sea Hen; Straitsview; J. Maunder), Shit-eater (B. Mactavish; JW), Aret, Bo's'n, Bosun Bird (McAtee). Last five names used in reference to all three jaeger species.

PARASITIC JAEGER: Dung Bird (Reeks; based on local misconception that these kleptoparasites ate feces of other seabirds they pursued), Marlingspike, Whiptail (McAtee).

LONG-TAILED JAEGER: see above two species.

GREAT SKUA: Sea Hen, Grand Goose (Templeman).

RING-BILLED GULL: Squeezy Gull (Reeks), Pond Gull (Peters and Burleigh), Fish Gull (North Harbour; T. Dalton).

HERRING GULL: Blue Gull (Reeks), Sea Gull (Labrador; Austin), Glue Gull (Ewing), Bluey (Loomis; Templeman), Summer Gull (L'Anse-aux-Meadows; B. Mactavish), Gluey (Lamberton).

ICELAND GULL: White-winged Gull (Reeks; also applied to Glaucous Gull), Ice Gull (Ewing), Slob Gull (associated with northern drift or slob ice; Templeman), Duck Gull (from habit of kleptoparasitizing and arriving with seaducks; Templeman; L'Anse-aux-Meadows, sometimes; B. Mactavish).

GLAUCOUS GULL: Large Ice Gull (Reeks; L'Anse-aux-Meadows, adults; B. Mactavish), Ice Gull (Ewing), Slob Gull (Templeman; L'Anse-aux-Meadows, first and second year birds; B. Mactavish), Burgomaster (Peters and

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Burleigh; an allusion to its dominating habits; McAtee), Burgeomaster (J. Maunder), Cold Eastern (L'Anse-aux-Meadows, adults; B. Mactavish), Minister Gull, White Minister (McAtee).

GREAT BLACK-BACKED GULL: Saddleback (Cartwright; in reference to the dark coloration of mantle), Wagel (British folk name for the immatures; Bewick, 1805; Bonnycastle), Saddler Gull, Old Saddler (Reeks, Story, et al.), Pondies (from frequenting ponds in summer, L'Anse-aux-Meadows, breeding adults; B. Mactavish), English Gull, Saddle-Back Gull, Black Back, Great Grey Gull (immatures; McAtee).

BLACK-LEGGED KITTIWAKE: Tarrock (first-year birds; Bewick, 1805; Bonnycastle; Fogo; J. Maunder), Fickler (misapplied to Bonaparte's Gull by Reeks), Ticklelace (Howley, 1889, *in* Story, et al.; like kittiwake imitative of bird's call or owing to gulls' habit of frequenting tickles), Tickle-ace, Ladybird, Lady (owing to delicate appearance; Templeman), Tickle-ass (Story, et al.), Lady (immatures), Tickle-else (J. Maunder), Tickelouse (Loomis), Mew (Anspach), Tickler, Kittiwake, Pinny Owl, Pinyole, Winter Gull (McAtee), Annett (a familiar or pet name, diminutive of Ann, a transfer from British provincial usage; McAtee), Ice Partridge (Southern Shore; J. Maunder).

IVORY GULL: Ice Partridge (Townsend, 1907; frequent edges of ice-pack and immature plumage has vague resemblance to ptarmigan's; McAtee), Snow Gull (Ewing), Ice Gull, Slob Gull (Templeman), Seal Bird (Fogo; J. Maunder), Winter Gull (McAtee).

CASPIAN TERN: Mackerel Gull (Peters and Burleigh), Mackerel Bird (Story, et al.), Rape (McAtee).

COMMON TERN: Sea Swallow (Bonnycastle), Steering (sonic; Reeks), Stearin, Paytrick (Ewing), Stearn (many spellings; Templeman; from British folk name starn; LMT), Stern (L'Anse-aux-Meadows; B. Mactavish), Pietrie (McAtee), Herring Gull (Salmonier; J. Maunder).

ARCTIC TERN: see above.

DOVEKIE: Bull (Cartwright), Ice-bird (Mason), Sea Dove, Little Auk (Bonnycastle), Bull-bird (De Boilieu, 1861, *in* Story, et al.), Gilly (tiny guillemot; Calvert; Brigus South; Ferryland), Nunchie (an allusion to its small size, just big enough for a nunch or lunch; Old Perlican), John Bull (Cape St. George; Templeman; LMT), Pigeon Diver, Little Bull (McAtee).

COMMON MURRE: Murre (Cartwright, Reeks; name used by some to distinguish this species from Thick-billed Murre), Turre (Thomas), Baccalao

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Bird (Anspach), Baccalieu Bird, Southern Turr, Tinker (Templeman), Marmette (McAtee).

THICK-BILLED MURRE: Murre (Cartwright, Bonnycastle, Reeks), Turre (Thomas; name used by some to distinguish this species from Common Murre), Northern Turr (Templeman), Baccalieu Bird (McAtee).

RAZORBILL: Tinker (Banks; from its habit of holding its head back like a thinker or from tinker, a craftsman of pots and pans, hence refers to the bird's black coloration), Razor-bill (Anspach), Baccalieu Bird (Coues), ?Little Diver, ?Pinwing (McAtee).

GREAT AUK: Penguin (Gilbert), Large Auk (Bonnycastle), Pinwing (Reeks), Whobble (refers to bird's awkwardness on land; McAtee).

BLACK GUILLEMOT: Sea-pigeon (Mason), Pigeon (Cartwright), Shore Duck, Wild Pigeon (McAtee), Redleg (Southern Shore; JW).

ATLANTIC PUFFIN: Parrot (Gilbert), Puffin (Banks), Sea Parrot (Cartwright), Baccalao Bird (Anspach), Sea-owl (Bonnycastle), Baccalieu Bird (Howley), Parakeet (Stearns, 1884, *in* Story et al.), Perroquet (Strait of Belle Isle; Browne, 1909, *in* Story, et al.), Hatchet Face (Ewing), Hatchet-bill (Templeman).

ROCK DOVE: Pigeon, Street Pigeon, Blue Rock, Dove (McAtee).

MOURNING DOVE: Love Bird (Ewing).

GREAT HORNED OWL: Cat Owl (Reeks), Harn Aowl (from Horned Owl; McAtee).

SNOWY OWL: Snow-White Owl (Bonnycastle), White Owl (Reeks), Arctic Owl (Peters and Burleigh), Snow Owl (LMT), Owl (pronounced "Howl," L'Anse-aux-Meadows; B. Mactavish).

NORTHERN HAWK-OWL: Tooting Owl (from its calls; LMT), Toot-aowl (McAtee).

SHORT-EARED OWL: Lopper (from its slow, buoyant flight; L'Anse-aux-Meadows; B. Mactavish), Cat Owl (McAtee).

NORTHERN SAW-WHET OWL: Saw-whet (Reeks), Tooting Owl (McAtee).

COMMON NIGHTHAWK: Night Hawk (Bonnycastle).

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CHIMNEY SWIFT: Swallow (McAtee).

RUBY-THROATED HUMMINGBIRD: Hummingbird (Jukes).

BELTED KINGFISHER: Kingfisher (Jukes).

DOWNY WOODPECKER: Woodpecker (B. Mactavish).

HAIRY WOODPECKER: Woodpecker (B. Mactavish).

NORTHERN FLICKER: Flicker, English Woodpecker (Reeks), Ram-pike (McAtee).

YELLOW-BELLIED FLYCATCHER: Yellow-hammer (indiscriminantly used for any small yellowish bird, Story, et al.).

HORNED LARK: Shore Lark (LMT; Labrador; Townsend and Allen), Mud Lark (L'Anse-aux-Meadows; B. Mactavish; Labrador; Townsend and Allen), Skylark (Labrador; Townsend and Allen).

EASTERN KINGBIRD: Bee Martin (Reeks).

TREE SWALLOW: White-bellied Swallow (Reeks), Martin (Aldrich and Nutt), Swallow (Peters and Burleigh).

BANK SWALLOW: Sand Martin (Reeks).

BARN SWALLOW: Swallow (Banks).

GRAY JAY: Jay (Cartwright), Whiskey Jack (Reeks; derived from an Indian name; Sclater), Moose Bird, Camp Robber (Sclater), Camp Jack (Ewing), Meat Bird, Lumber Jack (Peters and Burleigh), Thief (McAtee; most names refer to the jay's habit of stealing food at forest camps).

BLUE JAY: Silken Jay (Reeks), Silk Jay (LMT).

AMERICAN CROW: Crow (Whitbourne), Otter Crow (i.e., other crow; Reeks), Summer Crow (L'Anse-aux-Meadows, sometimes; B. Mactavish).

COMMON RAVEN: Raven (Whitbourne), Crow (Labrador; Townsend and Allen; LMT).

BLACK-CAPPED CHICKADEE: Pig-a-pea (Aldrich and Nutt), Tom-tit, Tom-tee, Pig-a-wee (LMT), Chick Chick (L'Anse-aux-Meadows; B. Mactavish), Fillady (A. Macpherson, 1981).

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BOREAL CHICKADEE: Tom-tit (McAtee), Chick Chick (L'Anse-aux-Meadows; Mactavish), Fillady (A. Macpherson, 1981).

RED-BREASTED NUTHATCH: Canada Nuthatch (Sclater), Upside-down Bird (Loomis), Flycatcher (Lamberton).

BROWN CREEPER: Woodpecker (McAtee).

WINTER WREN: Wood Chick, Poulette de bois (McAtee).

RUBY-CROWNED KINGLET: Foxy Chub (Aldrich and Nutt).

GRAY-CHEEKED THRUSH: Wide Eyes (L'Anse-aux-Meadows, sometimes; B. Mactavish), Wild Eyes (Straitsview; J. Maunder).

HERMIT THRUSH: Nightingale (Whitbourne), Swamp Angel (Sclater), Night Bird, Rossignol (McAtee).

AMERICAN ROBIN: Blackbird (Gilbert), Robin (Banks), Robin Red-breast (Story, et al.).

WATER PIPIT: Titlark (Sclater; Labrador; Townsend and Allen), Lark (McAtee), Skylark (L'Anse-aux-Meadows; B. Mactavish), Wagtail (Labrador; Townsend and Allen).

NORTHERN SHRIKE: Butcher Bird (Cartwright), Jay Killer (Labrador), Shreek (Labrador; Cabot, 1912, *in* Story, et al.), White Jay (McAtee).

EUROPEAN STARLING: English Blackbird (Story, et al.), Blackbird (L'Anse-aux-Meadows; B. Mactavish).

YELLOW WARBLER: Canary Bird (Gilbert), Gold Bird (Banks), Yellow-hammer (Reeks).

PALM WARBLER: Thumb Bird (McAtee).

BLACKPOLL WARBLER: Spruce Bird (Story, et al.).

BLACK-AND-WHITE WARBLER: Creeping Warbler (Sclater).

AMERICAN REDSTART: Goldfinch (Reeks; presumably refers to immature).

WILSON'S WARBLER: Canary Bird (Gilbert), Gold Bird (Banks), Yellowhammer (McAtee).

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CHIPPING SPARROW: Chipper (Sclater).

SAVANNAH SPARROW: Grass Bird (Reeks), Grassy Bird (Fogo; J. Maunder), Chip-bird (Labrador; Howe, 1901), Little Hound (Labrador; Austin), Ground Bird (L'Anse-aux-Meadows; B. Mactavish).

FOX SPARROW: Hedge Sparrow (Howley, 1876, *in* Story, et al.), Red Singer, Russingel (Labrador; Townsend and Allen), Foxy Tom (Howley, 1913, *in* Story, et al.), Tom Fox (Sclater), Labrador Sparrow (Aldrich and Nutt), Partridge Bird, Brown Bobber (McAtee), Foxy Chut (St John's; JW), Foxy Rogue, Foxy Ruler (Story, et al.), Foxy Rooter (perhaps from habit of scratching ground with both feet; J. Maunder), Head Spar (Birchy Cove; Lamberton).

WHITE-THROATED SPARROW: Canada Sparrow (from its call "Canada sweet Canada"; Sclater).

WHITE-CROWNED SPARROW: Hedge Sparrow, Whitecap (McAtee), Striped Head (striped pronounced as two distinct syllables; Lamberton 1976b), Stripey Head (B. Mactavish).

DARK-EYED JUNCO: Snow Bird (Reeks), Stone Chat (Labrador), Black Snowbird (Labrador; Packard, 1891, *in* Story, et al.), Blue Snow Bird (LMT), Hen Bird, Blue Sparrow (McAtee), Biff (Lamberton), Grey Sparrow (Story, et al.).

LAPLAND LONGSPUR: Biff, Brown Snowbird (L'Anse-aux-Meadows; Mactavish).

SNOW BUNTING: Snowbird (Cartwright), White Bird (Audubon), Sparrow (Tocque, 1846, *in* Story, et al.), White Snow Bird (LMT), Ortolan (McAtee).

RUSTY BLACKBIRD: Crow Blackbird, Crow, Marsh Blackbird (McAtee), Blackbird (B. Mactavish).

COMMON GRACKLE: Crow Blackbird (Reeks), Little Crow (Story, et al.).

PINE GROSBEAK: American Bullfinch (Cartwright), Pinefinch (Bonnycastle), Mope (Reeks; owing to sedentary habits, often allowing very close approach), Spruce Bird (Labrador; Townsend and Allen), Looper (Lamberton), Willow Bird (McAtee).

PURPLE FINCH: Linnet (Gilbert).

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RED CROSSBILL: Spruce Mope (Jackson, 1964, *in* Story et al.), Large Spruce Bird (Reeks), Spruce Bird (LMT).

WHITE-WINGED CROSSBILL: Cross-beaked Linnet (Cartwright), Spruce Bird (Reeks), Cross-billed Linnet (McAtee).

COMMON REDPOLL: Alder Bird (owing to nesting in alder bushes; Reeks; Labrador; Townsend and Allen), Tomtit (L'Anse-aux-Meadows; B. Mactavish), Red-headed Sparrow, Spruce Bird (McAtee).

PINE SISKIN: Yellow-winged Sparrow (Bonnycastle), Pine Finch (Reeks).

AMERICAN GOLDFINCH: Thistle Bird, Yellow Bird (Reeks).

HOUSE SPARROW: English Sparrow.

APPENDIX III

NATIONAL AND PROVINCIAL PARKS, WILDERNESS AREAS, AND WILDLIFE SANCTUARIES

NATIONAL PARKS

Terra Nova National Park.—Established in 1957, this park takes in an area of 405 sq. km of choice boreal forest along a spectacular section of the north-east coast (Fig. 40). One hundred-seventy avian species have been recorded within the park; 63 of these are known to nest (Burrows, 1980; Deichman and Bradshaw, 1984). Terra Nova is an important breeding area for Bald Eagle, Osprey, and Ruffed Grouse. Moose, Lynx, and Black Bear abound, and Caribou inhabit the fringes of the park. In 1967, 11 km of coastal region within the park's boundaries were designated as a Marine Sanctuary.

Gros Morne National Park.—A 1,550 sq. km park established on the west coast in 1973, Gros Morne has not yet been officially proclaimed under National Parks Legislation. Hunting and trapping in the area are presently prohibited by provincial legislation. The park is comprised of the region surrounding Bonne Bay, a portion of the Long Range Mountains, and a large coastal plain (see Fig. 40). Some of the rocky Long Range plateaus provide habitat for Rock Ptarmigan, which are not found in any other national park in eastern Canada, except for Baffin Island National Park. Alpine species, such as the White-crowned Sparrow and Tree Sparrow, also breed on the Long Range Mountains (Lamberton, 1976a; Montevecchi, et al., 1982). As of 1987, approximately 235 birds had been recorded in Gros Morne (B. Maybank, pers. comm.).

PROVINCIAL PARKS

The rate of establishment of provincial parks since 1960 has been phenomenal, owing in large measure to the efforts of George Chafe (Montevecchi, 1984). By 1977 there were 64 camping and day-use parks and public beaches on the island, providing a wide variety of opportunities for outdoor recreation (Fig. 40). Ninety per cent of park visitors are Newfoundland residents. Twelve fairly large provincial parks total some 168 sq. km and have well laid-out nature trails, interpretative displays, and programs (Table 23). These well located parks are representative of all major habitats found in Newfoundland. A visitor who spends a day or two in each of them, in the Provincial Seabird Sanctuaries, and in the two national parks can encounter an impressive array of Newfoundland birds. Many tourists come to the island expressly for that purpose.

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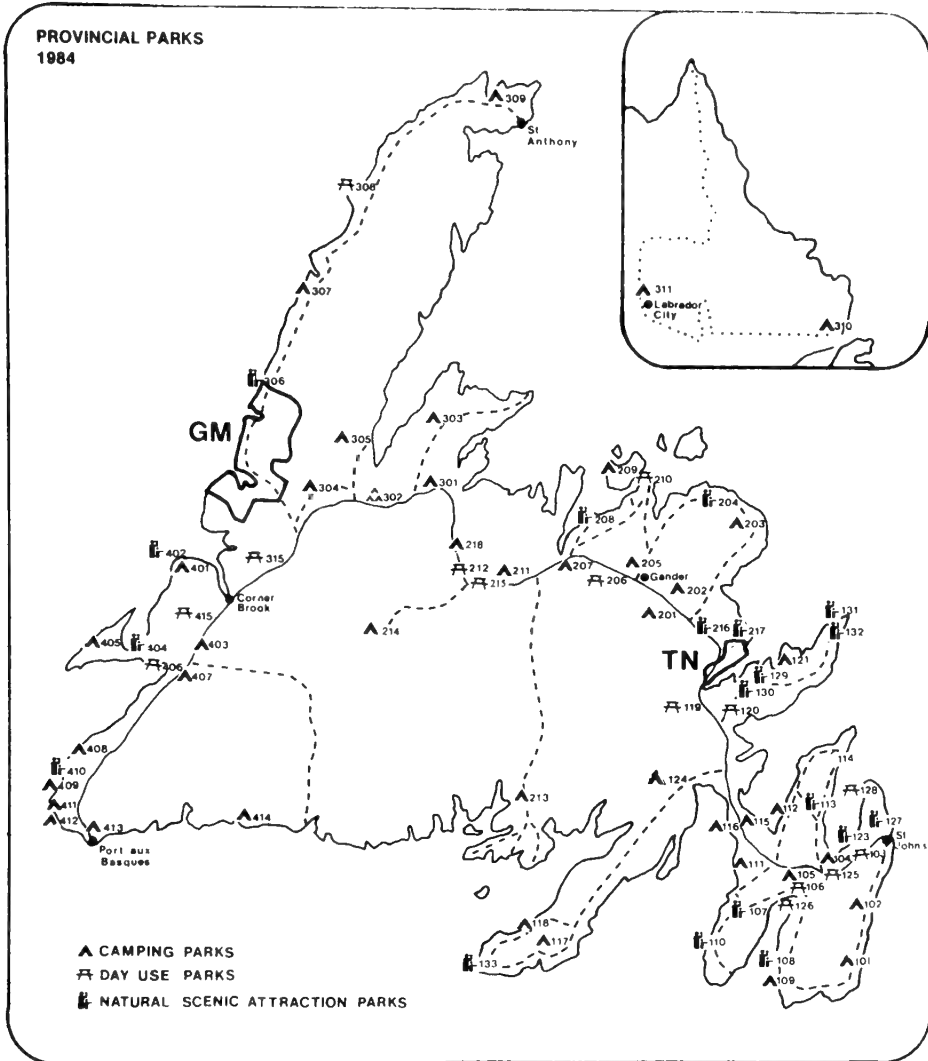


FIG. 40. The national and provincial parks of Newfoundland.

MUNICIPAL PARKS IN ST. JOHN'S

Bowring Park.—In 1911, to celebrate its centenary in the local business world, the Bowring family presented to the city 21 hectares of choice land in the west end of St. John's. The city purchased an additional 82 hectares to enlarge the park. Bowring Park, with its native and exotic trees and shrubs, is a favorite birding area in St. John's and is especially attractive to warblers. Some recent provincial records (e.g., Hooded Warbler) have been made there.

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TABLE 23. Provincial parks larger than 400 hectares.

	SIZE (HA)	DATE OPENED
Squires Memorial	3,497	1959
Jack's Pond	486	1959
Piper's Hole River	447	1960
Barachois	3,497	1961
Butterpot	1,752	1964
Jonathan's Pond	446	1966
La Manche	1,395	1966
Fitzgerald's Pond	930	1972
Backside Pond	563	1972
Freshwater Pond	892	1973
Pistolet Bay	890	1974
Chance Cove	2,068	1974

Pippy Park.—Pippy Park covers an area of about 1,600 hectares, including the grounds of Memorial University, and was established in the northeastern section of St. John's in 1968. Overseen by the Pippy Park Commission, it has until recently been largely a recreation and conservation area. Included within its boundaries is Long Pond with its shallow and marshy borders, where Red-winged Blackbirds, Soras, bitterns, Northern Pintail, and Green- and Blue-winged Teal have been recorded breeding. The wetlands are an important habitat where marsh birds, such as coots and grebes, and exotic strays (e.g., egrets and herons) are seen each spring and fall. The park which is designated as an "institutional park" is presently being sliced up by road networks.

Memorial University Botanic Park at Oxen Pond is situated within Pippy Park and is a separate entity of 35 hectares set aside for those wishing to enjoy nature, especially plantlife, in a quiet peaceful setting. Indigenous plants and shrubs, including alpine species, are well represented, as are many exotics, particularly those that attract butterflies. Twenty-six species of butterfly, several of which are rare in Newfoundland have been recorded (B. Jackson, pers. comm.). Careful records are kept of the breeding and visiting birds in the park, and more than 100 species are recorded on the park checklist (B. Jackson, pers. comm.). Feeders assure an interesting winter population, especially of Evening Grosbeaks that also have been recorded breeding.

SEABIRD SANCTUARIES

Newfoundland has several of the most spectacular seabird colonies in North America. These sites are considered at length in Chapter 9. It was with considerable foresight that the provincial government designated most of the larger colonies as Provincial Seabird Sanctuaries in 1964. As indicated in earlier, Baccalieu Island, being the major exception, is in the process of be-

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coming a Provincial Seabird Sanctuary under the provisions of the Wilderness and Ecological Reserves Act (see p. 161).

HARE BAY EIDER DUCK SANCTUARY

Eiders formerly bred in large numbers in Hare Bay at the tip of the Northern Peninsula. The creation of a sanctuary there in 1964, encompassing Spring, Brent, and Duck Islands, did not produce the desired result of increasing the breeding population. The islands are too near the settlement of Hare Bay. The considerable boat traffic and consequent disturbance in the area seems to discourage the eiders from nesting there. Efforts are being made to encourage the eiders to re-establish there (I. Goudie, pers. comm.).

CODROY WATERFOWL REFUGE

The Codroy waterfowl sanctuary, an area of 13 sq. km, was established in 1974 to include a productive fall staging area for waterfowl. It was the site of a waterfowl banding station from 1947 to 1951, and banding work is carried out there today. The provincial wildlife division has attempted to establish a breeding population of Canada Geese in the area (D. Pike, pers. comm.), which is closed to all hunting because of the danger to school children and others in the immediate vicinity. Covered under legislation by a "Hunting Prohibition Order," it is not a legal sanctuary, but the effect on birds, particularly waterfowl, is the same.

AVALON WILDERNESS AREA

An area of about 850 sq. km in the center of the Avalon Peninsula was established in 1964 as a provincial wilderness area, where commercial development and private cabins are prohibited. Undue disturbance to wildlife is also prohibited in this expanse of unspoiled barrens. However, there are fewer restrictions on wildlife use than in a National Park, and hunting and trapping are permitted during the open season. The Avalon Wilderness Area is the home of a large Caribou herd, which has increased substantially since the area was protected and poaching deterred. The densities of dabbling ducks in this area are among the highest in the province (I. Goudie, pers. comm.).

The former Central Wilderness Area near the center of the island was, unfortunately, removed from protective status in 1973. Such governmental back-peddling makes a sham of the conservation process and is to be scorned by a conservationally concerned public. Several other areas in Labrador and Newfoundland are currently under consideration for wilderness area status.

SALMONIER NATURE PARK

Salmonier Nature Park (approximately 1,200 hectares) borders the Avalon Wilderness Area and is one of the most interesting parks in North America.

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Situated about 45 km west of St. John's in a typical boreal forest biome with glacial ridges, it is an interesting example of the succession of boreal forest types after fires and the commercial use of the timber. Indigenous animals are housed in large enclosures resembling their natural habitats as closely as possible. Most of the typical boreal forest birds occur there, and a walk along the three-kilometer nature trail, with its elevated boardwalks over bogs and marshy areas, can be quite rewarding. It was opened to the public in 1978 by the Newfoundland and Labrador Wildlife Division, and there are plans for further development with trails into the Avalon Wilderness Area for cross-country skiing, snowshoeing, and hiking.

APPENDIX IV

SCIENTIFIC NAMES OF ANIMALS* AND PLANTS

*Bird names are given in Appendix I.

MAMMALS

Arctic Fox, *Alopex lagopus*
 Arctic Hare, *Lepus arcticus bangsii*
 Beaver, *Castor canadensis caecator*
 Black Bear, *Ursus americanus hamiltoni*
 Caribou, *Ranifer tarandus terranovae*
 Harp Seal, *Pagophilus groenlandicus*
 Lynx, *Lynx canadensis*
 Masked Shrew, *Sorex cinereus cinereus*
 Mink, *Mustela vison*
 Moose, *Alces alces*
 Newfoundland Wolf, *Canus lupus beothucus*
 Pine Martin, *Martes americana atrata*
 Polar Bear, *Thalarctos maritimus*
 Red Fox, *Vulpes vulpes delectrix*
 Short-tailed Weasel, *Mustela erminea*
 Snowshoe Hare, *Lepus americanus*
 Walrus, *Odobenus rosmarus*

INSECTS

Balsam Fir Sawfly, *Neodiprion abietes*
 Balsam Woolly Aphid, *Adelges piceae*
 Birch Casebearer, *Caleophora fuscadinella*
 Eastern Hemlock Looper, *Lambdina fiscellaria*
 Larch Casebearer, *Caleophora laricella*
 Larch Sawfly, *Pristiphora erichsonii*
 Spruce Budworm, *Choristoneura fumiferana*

PLANTS

Bake-Apple, *Rubus chamaemorus*
 Balsam Fir, *Abies balsamea*
 Balsam Poplar, *Populus balsamifera*
 Black Spruce, *Picea mariana*
 Blueberry, *Vaccinium angustifolium*
 Bog Alder, *Alnus ruogsa*
 Bog Aster, *Aster nemoralis*
 Bogbean, *Menyanthes trifoliata*
 Bog Goldenrod, *Solidaga uliginosa*
 Bog Myrtle, *Myrica gale*
 Bog Rose, *Rosa nitada*
 Canadian Burnet, *Sanguisorba canadensis*
 Crowberry, *Empetrum nigrum*
 False Solomon's Seal, *Smilacina trifolia*
 Goldthread, *Coptis groenlandicum*
 Larch, *Larix larcina*
 Laurel, *Kalmia* spp.
 Northern Fly-Honeysuckle, *Lonicera villosa*
 Pin Cherry, *Prunus pensylvanica*
 Pitcher-Plant, *Sarracenia purpurea*
 Red Maple, *Acer rubrum*
 Red Pine, *Pinus resinosa*
 Rhodora, *Rhododendron canadese*
 Shadbush, *Amelanchier* spp.
 Sweet Gale, *Myrica gale*
 Tall Meadow-Rue, *Thalictrum polygantum*
 Trembling Aspen, *Populus tremuloids*
 White Birch, *Betula papyrifera*
 White Pine, *Pinus strobus*
 White Spruce, *Picea glauca*
 Willow, *Salix* spp.
 Yellow Birch, *Betula lutea*

LITERATURE CITED

- AINLEY, D. G. AND T. J. LEWIS. 1974. The history of Farallon Island marine bird populations, 1854–1972. *Condor*, **76**:432–446.
- AKENHEAD, S. A., J. CARSCADDEN, H. LEAR, G. R. LILLY, AND R. WELLS. 1979. On the cod-capelin interaction of northeast Newfoundland and Labrador. *Sympos. Multispec. Fish. Manag.*, St. John's.
- ALBIN, E. 1738. *A Natural History of Birds*. 2 vols. Innys & Manby, London.
- ALDRICH, J. W. AND D. C. NUTT. 1939. Birds of eastern Newfoundland. *Sci. Publ. Cleveland Mus. Nat. Hist.*, **4**:13–42.
- ALLEN, D. L. 1954. *Our Wildlife Legacy*. Funk & Wagnalls, New York.
- ALLEN, E. G. 1951. The history of American ornithology before Audubon. *Trans. Amer. Phil. Soc.*, **41**:398–591.
- ALLEN, J. A. 1876. The extinction of the Great Auk at the Funk Islands. *Amer. Nat.*, **10**:48.
- . 1879. Notes on the sea-birds of the Grand Banks. *Bull. Nuttall Ornithol. Club*, **4**:127–128.
- . 1885. Turner's list of the birds of Labrador. *Auk*, **2**:368–369.
- AMERICAN ORNITHOLOGISTS' UNION. 1957. *Check-list of North American Birds*. 5th ed., Amer. Ornith. Union, Baltimore.
- . 1973. Thirty-second supplement to the American Ornithologists' Union *Check-list of North American birds*. *Auk*, **90**:411–419.
- . 1983. *Check-list of North American Birds*. 6th ed. Amer. Ornith. Union, Lawrence, Kansas.
- ANDERSON, A. 1982. The establishment and growth of a new fulmar colony on sand dunes. *Bird Study*, **29**:189–194.
- ANKER, J. 1938. *Bird Books and Bird Art*. Levin & Munksgaard, Copenhagen.
- ANONYMOUS. 1889. Daring act of American ornithologist at Bird Island. *Evening Telegr.*, St. John's, July 19.
- ANSPACH, L. A. 1819. *A History of the Island of Newfoundland*. J. M. Richardson, London.
- ARNOLD, E. 1912. A summer outing in Newfoundland, 1911. *Auk*, **29**:72–79.
- AUBRY, Y. 1984. First nests of the Common Black-headed Gull in North America. *Amer. Birds*, **38**:336–337.
- AUDUBON, J. J. 1827–38. *The Birds of America*. 4 Vols. London.
- . 1831–39. *Ornithological Biography*. 5 Vols. A. and C. Black, Edinburgh.
- AUDUBON, M. R. (ed.). 1897. *Audubon and His Journals*. 2 vols. Scribner's, New York.
- AUSTIN, O. L., JR. 1932. The Birds of Newfoundland Labrador. *Mem. Nuttall Ornith. Club*, no. 7, 229 p.
- AYRE, M. 1937. Newfoundland flowers, p. 86–103. *In* J. R. Smallwood (ed.), *The Book of Newfoundland*. Vol. 1. Newfoundland Book Publ., St. John's.

LITERATURE CITED

- BAGG, A. M. 1967. Factors affecting the occurrence of the Eurasian Lapwing in eastern North America. *Living Bird*, **6**:87–122.
- BAILEY, A. C. 1969. *The Conflict of European and Eastern Algonkian Cultures, 1504–1700* (2nd ed.). Univ. Toronto, Toronto.
- BAILEY, H. H. 1939. Labrador bird records. *Bailey Mus. Lib. Hist. Bull.*, **13**:1–2.
- BANFIELD, C. E. 1983. Climate, p. 37–106. *In* G. R. South (ed.), *Biogeography and Ecology of the Island of Newfoundland*. Junk, The Hague.
- BANGS, O. 1900. Occurrence of the Little Blue Heron in Labrador. *Auk*, **17**:386.
- . 1913. The land mammals of Newfoundland. *Bull. Mus. Comp. Zool.*, **54**:507–516.
- BARKHAM, S. 1982. Documentary evidence for sixteenth century Basque whaling ships in the Strait of Belle Isle, p. 53–95. *In* G. M. Story (ed.), *Early Settlement and Exploitation in Atlantic Canada*. Memorial Univ. Newfoundland, St. John's.
- BARRETT, R. T. 1979. Changes in the population of gannets *Sula bassana* in North Norway. *Fauna Norv., Ser. C, Cinclus*, **2**:23–26.
- BARTELS, D. 1979. Time immemorial? A research note on Mimacs in Newfoundland. *Newfoundland Quart.*, **75**(3):6–9.
- BATCHELDER, C. F. 1908. The Newfoundland Hairy Woodpecker. *Proc. New England Zool. Club*, **4**:37–38.
- . 1918. Two undescribed Newfoundland birds. *Proc. New England Zool. Club*, **6**:81–82.
- BEAGLEHOLE, J. C. (ed.) 1963. *The Endeavour Journal of Joseph Banks 1768–1771*. 2 Vols. Halstead Press, Sydney.
- BEER, C. G. 1963. Joseph Banks: the *Endeavour* journal. *Landfall*, **17**:168–177.
- BENNETT, G. 1977. Effect of pesticide spray program on resident birds. Unpubl. MS.
- BENT, A. C. 1912. A new species of crossbill. *Smiths. Misc. Coll.*, **60**:1–3.
- . 1921. Life Histories of North American Gulls and Terns. *Bull. U.S. Nat. Mus.*, **113**:1–345.
- . 1968. Life Histories of North American Cardinals, Grosbeaks, Buntings, Towhees, Finches, Sparrows and Allies. 3 vols. *Bull. U.S. Nat. Mus.*, **237**:1–1889.
- BEWICK, T. 1805. *A History of British Birds*. Vol. 2. Walker, Newcastle.
- BIGELOW, H. L. 1890. Five months in Newfoundland. *Ornith. Oolog.*, **16**:70–72.
- BIGGAR, H. P. 1924. *Voyages of Jacques Cartier*. Publ. Public Arch. Canada., no. 11, 330 p.
- BIRKET-SMITH, K. 1929. *The Caribou Eskimos*. Copenhagen, Rept. 5th Thule Exped. Vol. 5. (Not seen; cited *in* J. A. Tuck, 1976.)
- BIRKHEAD, T. R. AND D. N. NETTLESHIP. 1980. Census methods for murre, s,

LITERATURE CITED

- Uria* species: a unified approach. Canadian Wildl. Serv. Occas Paper, no. 43, 25 p.
- BLAKE, C. H. 1975. Introductions, transplants, and invaders. Amer. Birds, **29**:923-926.
- BLANKESPOOR, G. W. 1980. Bird awareness among early Great Plains people. S. Dakota Bird Notes, 1980: 68-74.
- BOND, G. M. 1962. A new blue jay (*Cyanocitta cristata burleighi*) from Newfoundland. Proc. Biol. Soc. Washington, **75**:205-206.
- BONNYCASTLE, R. H. 1841. The Canadas in 1841. H. Colburn, London.
- . 1842. Newfoundland in 1842: A Sequel to The Canadas in 1841. Henry Colburn, London.
- BREWSTER, W. 1883. On an apparently new gull from eastern North America. Bull. Nuttall Ornith. Club, **8**:214-219.
- . 1885. The Rock Ptarmigan of Newfoundland. Auk, **2**:193-195.
- . 1888. Descriptions of supposed new birds from lower California, Sonora and Chihuahua, Mexico and the Bahamas. Auk, **5**:82-95.
- . 1906. Occurrence of the Lapwing (*Vanellus vanellus*) and the Turkey Buzzard (*Cathartes aura*) in Newfoundland. Auk, **23**:221.
- BROOKS, E. A. 1936. Observation on some Newfoundland birds. Auk, **53**:342-345.
- BROWN, R. G. B. 1970. Fulmar distribution: a Canadian perspective. Ibis, **111**:44-51.
- . 1980. Seabirds as marine animals, p. 1-39. In J. Burger, B. L. Olla, and H. E. Winn (eds.), Behavior of Marine Animals. Current Perspectives in Research. Vol. 4. Seabirds. Plenum Press, New York.
- . 1983. Voyage of the Iceberg. Lorimer, Toronto.
- . 1985. The Atlantic Alcidae at sea, p. 383-426. In D. N. Nettleship and T. R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, Orlando.
- . 1986. Revised Atlas of Eastern Canadian Seabirds. I. Shipboard Surveys. Supplies and Services Canada, Ottawa.
- BROWN, R. G. B. AND D. N. NETTLESHIP. 1984. Capelin and seabirds in the Northwest Atlantic, p. 184-195. In D. N. Nettleship, G. A. Sanger, and P. F. Springer (eds.), Proc. Pacific Seabird Group Sympos., 1982. Canadian Wildl. Ser., Ottawa.
- BROWN, R. G. B., D. N. NETTLESHIP, P. GERMAIN, C. E. TULL, AND T. E. DAVIS. 1975. Atlas of Eastern Canadian Seabirds. Information Canada, Ottawa.
- BROWN, W. J. 1911. Some Newfoundland bird notes—May, June, July, 1911. Ottawa Nat., **25**:89-99.
- . 1912. Additional notes on birds of Newfoundland. Ottawa Nat., **26**:93-98.
- BRUEMMER, F. 1971. Funk Island. Nat. Hist., **80**(6):52-56.
- BRUN, E. 1974. Breeding success of gannets *Sula bassana* at Nordmjele, Andoya, North Norway. Astarte, **7**:77-82.

LITERATURE CITED

- BRUTON, F. A. 1927. The bird-islands of Newfoundland. *Daily News*, St. John's, Oct. 25, p. 27.
- BRUTON, F. A. AND N. M. JOHNSON. 1932. The Bruton Memorial Book of Nature Study. Oliver & Boyd, Edinburgh.
- BUMP, G. 1963. History and analysis of tetranoid introductions into North America. *Journ. Wildl. Manag.*, **27**:855-867.
- BURGER, A. E. AND J. COOPER. 1984. The effects of fisheries on seabirds in South Africa and Namibia, p. 150-160. *In* D. N. Nettleship, G. A. Sanger, and P. F. Springer (eds.), *Proc. Pacific Seabird Group Sympos.*, 1982. Canadian Wildl. Serv., Ottawa.
- BURLEIGH, T. D. 1929-30. Notes on the bird life of northwestern Washington. *Auk*, **46**:502-519, **47**:48-63.
- . 1958. *Georgia Birds*. University of Oklahoma, Norman.
- . 1972. *Birds of Idaho*. Caxton Printers, Caldwell, Idaho.
- BURLEIGH, T. D. AND H. S. PETERS. 1948. Geographic variation in Newfoundland birds. *Proc. Biol. Soc. Washington*, **61**:111-126.
- BURROWS, R. 1980. Checklist of the Birds of Terra Nova National Park. Parks Canada, Glovertown, Newfoundland.
- BUSBY, D. G., P. A. PEARCE AND N. R. GARRITY. 1981. Brain cholinesterase response in songbirds exposed to experimental fenitrothion spraying in New Brunswick, Canada. *Bull. Environm. Contamn. Toxicol.*, **26**:401-406.
- . 1983a. Brain chE response in forest songbirds exposed to aerial spraying of aminocarb and possible influence of application methodology and insecticide formulation. *Bull. Environm. Contamn. Toxicol.*, **31**:125-131.
- BUSBY, D. G., P. A. PEARCE, N. R. GARRITY, AND L. M. REYNOLDS. 1983b. Effect of an organophosphorus insecticide on brain cholinesterase activity in White-throated Sparrows exposed to aerial forest spraying. *Journ. Appl. Ecol.*, **20**:255-263.
- CABOT, W. B. 1912. *In* Northern Labrador. Garham, Boston. (Not seen; cited in Story, et al., 1982.)
- CACCIA, C. 1984. Statement on the occasion of the formal announcement establishing Wildlife Habitat Canada Foundation, 20 February 1984. Ottawa.
- CAHOON, J. C. 1888. The shore birds of Cape Cod. *Ornith. Oolog.*, **13**:121-124, 129-132, 153-156.
- CAIRNS, D. K., R. D. ELLIOT, W. THRELFALL, AND W. A. MONTEVECCHI. 1986. Researcher's Guide to Newfoundland Seabird Colonies. Memorial Univ. Newfoundland Occas. Papers Biol., no. 10, 50 p.
- CAIRNS, W. E. AND I. A. MCLAREN. 1980. Status of the Piping Plover on the east coast of North America. *Amer. Birds*, **34**:206-208.
- CALLAGHAN, E. B. 1980. The history of the Newfoundland Museum. *Mus. Notes*, no. 2:1-4.

LITERATURE CITED

- CANNINGS, R. J. 1977. The Breeding Biology of the Horned Lark (*Eremophila alpestris alpestris* L.) at Cape St. Mary's, Newfoundland. M.Sc. thesis, Memorial Univ. Newfoundland, St. John's.
- CARIGNAN, P. C. 1975. The beaches: a multi-component habitation site in Bonavista Bay. Mercury Ser., no. 39. Nat. Mus. Canada, Ottawa.
- CARSCADDEN, J. E. 1983a. Capelin as a forage species: A review of selected studies. NAFO SCR Doc. 83/IX/72.
- . 1983b. Capelin (*Mallotus villosus*) in the northwest Atlantic, p. 170–183. In D. N. Nettleship, G. A. Sanger, and P. F. Springer (eds.), Proc. Pacific Seabird Sympos., 1982. Canadian Wildl. Serv., Ottawa.
- . 1984. Population dynamics and factors affecting the abundance of capelin (*Mallotus villosus*) in the Northwest Atlantic. Unpubl. ms.
- CARTWRIGHT, G. 1792. A Journal of Transactions and Events, during a Residence of Nearly Sixteen Years on the Coast of Labrador. Allen and Ridge, Newark, England.
- CATESBY, M. 1731–43. Natural History of Carolina, Florida, and the Bahama Islands. London. (Not seen; cited in Lysaght, 1971.)
- CHAPMAN, F. M. 1895. Handbook of Birds of Eastern North America. Appleton, New York.
- . 1934. Handbook of Birds of Eastern North America. 2nd Ed. Appleton, New York.
- CHOATE, E. A. 1973. The Dictionary of American Bird Names. Gambit, Boston.
- CHRISTIE, D. S. 1979. Changes in maritime bird populations, 1878–1978. Journ. New Brunswick Mus., 1979:132–146.
- CLARKE D. 1934. Public School Explorers in Newfoundland. University Press, Glasgow.
- COADY, L. W. 1978. Immediate chemical and toxological influences of aerially applied aminocarb in selected Newfoundland streams. Surveil. Rept. Atlantic Reg. EPS-5-AR-78-1.
- COLLINS, J. W. 1882. Notes on the habits and methods of capture of various species of sea birds that occur on the fishing banks off the eastern coast of North America, and which are used as bait for catching codfish by New England fishermen. Smiths. Misc. Coll., 46:311–138 (Not seen; cited in Laird, 1980.)
- CORMACK, W. E. 1823. Narrative of a journey across the island of Newfoundland in 1822. Edinburgh Phil. Journ., 10:156–162.
- COX, S. L. 1978. Paleo-Eskimo occupations of the north Labrador Coast. Arctic Anthrol., 15:96–117.
- COX, S. L. AND A. SPIESS. 1980. Dorset settlement and subsistence in northern Labrador. Arctic, 33:659–669.
- CUMBAA, S. 1984. 'Diverse fures and deeress flesh'—Animal use by a 17th century Beothuk population at Boyd's Cove, Notre Dame Bay, Newfoundland. Unpubl. Rept. (Mar. 1984), Zooarcheological Identification Ctr., Nat. Mus., Ottawa.

LITERATURE CITED

- DAMMAN, A. W. H. 1964. Some forest types of central Newfoundland and their relation to environmental factors. *Forest Sci. Monogr.*, **8**:1–62.
- . 1983. An ecological subdivision of the Island of Newfoundland, p. 163–200. *In* G. R. South (ed.), *Biogeography and Ecology of the Island of Newfoundland*. Junk, The Hague.
- DARWIN, C. 1859. *On the Origin of Species*. Murray, London.
- DAVIES, O. J. H. AND R. D. KEYNES. 1948. The Cape St. Mary gannet colony, Newfoundland. *Ibis*, **90**:538–546.
- DEICHMANN, K. H. AND D. B. BRADSHAW (eds.). 1984. *Terra Nova National Park Resource Description and Evaluation*. Parks Canada, Ottawa.
- DENYS, N. 1672. *The Description and Natural History of the Coasts of North America* (F. W. Ganong, ed., 1908). Univ. Toronto, Toronto.
- DESANTE, D. F. AND D. G. AINLEY. 1980. The Avifauna of the South Farallon Islands. *Cooper Ornith. Soc., Studies Avian Biol.*, no. 4, 104 p.
- DIBENEDICTIS, P. A. 1983. Coming! A new official checklist of North American birds—a revolution in avian nomenclature. *Amer. Birds*, **37**:3–8.
- DODDS, D. 1983. Terrestrial mammals, p. 509–550. *In* G. R. South (ed.), *Biogeography and Ecology of the Island of Newfoundland*. Junk, The Hague.
- DRURY, W. H. 1973. Population changes in New England seabirds. *Bird-Banding*, **44**:267–313.
- DUFFY, D. C. AND W. R. SIEGFRIED. 1987. Historical variations in food consumption by breeding seabirds of the Humboldt and Benguela upwelling regions, pp. 327–346. *In* J. P. Croxall (ed.), *Seabirds: Feeding Ecology and Role in Marine Ecosystems*. Cambridge University, Cambridge.
- DUNNET, G. 1977. Dramatic spread of the fulmar. *Wildlife, London*, **19**:462–467.
- EDWARDS, G. 1743–51. *A Natural History of Uncommon Birds*. London.
- ELLIOT, J. 1786. *Proclamation to His Majesty's Trustees of the Peace*. St. John's, Newfoundland.
- ENGLISH, A. 1918. Gannet colonies. *Ottawa Nat.*, **32**:98.
- ERSKINE, A. J. 1963. The black-headed gull (*Larus ridibundus*) in eastern North America. *Audubon Field Nat.*, **17**:334–338.
- . 1977. *Birds in Boreal Canada*. Canadian Wildl. Serv., Ottawa.
- EWING, J. R. 1937. Wild birds of Newfoundland, p. 43–50. *In* J. R. Smallwood (ed.), *The Book of Newfoundland*. Vol. 2. Newfoundland Book Publ., St. John's.
- FARBER, P. L. 1976. The type-concept in zoology during the first half of the nineteenth century. *Journ. Hist. Biol.*, **9**:93–119.
- . 1977. The development of taxidermy and the history of ornithology. *Isis*, **68**:550–566.
- . 1982. *The Emergence of Ornithology as a Scientific Discipline: 1760–1850*. Reidel, Boston.

LITERATURE CITED

- FARMER, G. H. 1981. The cold ocean environment of Newfoundland, p. 56–82. *In* A. G. Macpherson and J. B. Macpherson (eds.). *The Natural Environment of Newfoundland Past and Present*. Memorial Univ. Newfoundland, St. John's.
- FINCH, D. W. 1978. Black-headed Gulls nesting in Newfoundland. *Amer. Birds*, **32**:312.
- FISHER, J. 1952. *The Fulmar*. Collins, London.
- . 1966. The fulmar population of Britain and Ireland, 1959. *Bird Study*, **13**:5–76.
- FJELDSÅ, J. 1985. Subspecies recognition in ornithology: history and the current rationale. *Fauna Norv., Ser. C., Cinclus*, **8**:57–63.
- FORBUSH, E. H. 1912. *Game Birds, Wild-fowl and Shorebirds of Massachusetts*. Mass. Board Agric., Boston.
- FORSTER, J. R. 1771. *A Catalogue of the Animals of North America*. White, London.
- FOSTER, J. 1978. *Working for Wildlife: The Beginning of Preservation in Canada*. Univ. Toronto Press, Toronto.
- FRADKIN, A. 1980. Bird remains from two south Florida prehistoric sites. *Florida Sci.*, **43**:111–115.
- FRAZAR, A. 1887. An ornithologists's summer in Labrador. *Oolog. Ornith.*, **12**:1–3, 17–20, 33–35.
- FREEMAN, R. B. AND D. WERTHEIMER. 1980. *Philip Henry Gosse: A Bibliography*. Dawson, Kent, England.
- FUERTES, L. A. 1920. Falconry, the sport of kings. *Nat. Geogr.*, **38**:429–460.
- FURNESS, R. W. 1983. Competition between fisheries and seabird communities. *Adv. Mar. Biol.*, **20**:225–307.
- GARRITY, D. A. 1960. Fabulous Funk Island. *Mass. Audubon*, **45**:1–9.
- GASTON, A. J. AND D. N. NETTLESHIP. 1981. The Thick-billed Murres of Prince Leopold Island. *Canadian Wildl. Serv. Monogr. Ser.*, no. 6, 349 p.
- GILBERT, B. M., L. D. MARTIN, AND H. G. SAVAGE. 1981. *Avian Osteology*. Modern Printing, Laramie, Wyoming.
- GILLIARD, E. T. 1937. The gannets of Funk Island. *Auk*, **54**:379–381.
- GMELIN, J. F. (ed.). 1788. Thirteenth Edition of Linnaeus's *Systema Naturae per Regna Tria Naturae*. (Not seen; cited in Lysaght, 1971.)
- GODFREY, W. E. 1951. Geographical variation in the Boreal Chickadee east of the Rockies. *Canadian Field-Nat.*, **65**:22–26.
- . 1959. Notes on Newfoundland birds. *Bull. Nat. Mus. Canada*, no. 172, p. 98–111.
- . 1966. The Birds of Canada. *Bull. Nat. Mus. Canada*, no. 203, 428 p.
- . 1986. The Birds of Canada. Revised ed. *Nat. Mus. Canada*, Ottawa.
- GOLLOP, J. B., T. W. BARRY, AND E. H. IVERSON. 1986. Eskimo Curlew: A Vanishing Species. *Saskatchewan Nat. Hist. Soc. Spec. Pub.*, no. 17, 160 p.

LITERATURE CITED

- GOSSE, E. 1896. *The Naturalist of the Sea-Shore: The Life of Philip Henry Gosse*. Heinemann, London.
- GOSSE, P. H. 1840. *The Canadian Naturalist*. Van Voorst, London.
- . 1844. *An Introduction to Zoology*. 2 Vols. Society for Promoting Christian Knowledge, London.
- . 1847. *The Birds of Jamaica*. Van Voorst, London.
- GOUDIE, R. I. 1981. Marine bird observations at Cape St. Mary's, Placentia and St. Mary's Bays, Newfoundland, winter 1978–79. *Canadian Wildl. Serv. Prog. Note*, no. 124, 10 p.
- GREENWAY, J. C., JR. 1967. *Extinct and Vanishing Birds of the World*. Dover, New York.
- GRIEVE, S. 1885. *The Great Auk or Garefowl*. Jack, London.
- GRISCOM, L. 1922. Field studies of the Anatidae of the Atlantic coast. *Auk*, **39**:517–530.
- . 1923. Birds of the New York City Region. *Amer. Mus. Nat. Hist. Handbook Ser.* no. 9, 400 p.
- . 1926. Notes on the summer birds of the west coast of Newfoundland. *Ibis*, 1926:656–684.
- . 1934. The Pine Grosbeaks of eastern North America. *Proc. New England Zool. Club*, **14**:5–12.
- . 1937. A monographic study of the Red Crossbill. *Proc. Boston Soc. Nat. Hist.*, **41**:77–210.
- GRISCOM, L. AND E. R. P. JANVRIN. 1922. Cory's Shearwater off Newfoundland, with remarks on its identification in life. *Auk*, **39**:103–104.
- GRISCOM, L. AND D. SNYDER. 1955. *The Birds of Massachusetts*. Peabody Mus., Salem.
- GROSS, A. O. 1937. Birds of the Bowdoin-MacMillan Arctic Expedition, 1934. *Auk*, **54**:12–42.
- GROSS, W. A. O. 1935. The life history cycles of Leach's Petrel (*Oceanodroma leucorhoa leucorhoa*) on the outer sea islands of the Bay of Fundy. *Auk*, **52**:382–399.
- GUTSELL, B. V. 1949. *An Introduction to the Geography of Newfoundland*. Canadian Dept. Mines & Resources, Ottawa.
- HAKLUYT, R. 1589–1600. *The Principal Navigations Voyages Traffiques & Discoveries of the English Nation*. . . Dent, London. [Reprinted 1907.]
- HALL, E. S. JR. 1969. Avian remains from the Kangiguksuk site, northern Alaska. *Condor*, **71**:76–77.
- HALL, R. H. 1981. A new approach to pest control in Canada. *Canadian Environ. Adv. Counc. Rept.* no. 10, 47 p.
- HARE, F. K. 1952. The climate of the island of Newfoundland: a geographical analysis. *Geogr. Bull.*, **2**:36–87.
- HARP, E. JR. 1951. An archaeological survey in the Strait of Belle Isle area. *Amer. Antiq.*, **16**:203–220.

LITERATURE CITED

- . 1964. Cultural affinities of the Newfoundland Dorset Eskimo. Bull. Nat. Mus. Canada, no. 200, 183 p.
- HARPER, F. 1964. The friendly Montagnais and their neighbors in the Ungava Peninsula. Univ. Kansas, Mus. Nat. Hist. Misc. Publ., **37**:1–120.
- HARRISSE, H. 1900. Decouverte et Evolution Cartographique de Terre-Neuve. Stevens, London.
- HARVEY, M. 1874, 1875. The birds of Newfoundland. Forest and Stream, **3**:53, 196; **4**:341.
- . 1892. Romance of the Great Auk. St. John's Trade Rev., **5**(Christmas issue):8.
- HATTON, J. AND A. M. HARVEY. 1883. Newfoundland, Its History, Its Present Condition and Its Prospects in the Future. Doyle & Whittle, Boston.
- HAY, O. P. 1902. On the finding of the bones of the Great Auk (*Plautus impennis*) in Florida. Auk, **19**:255–258.
- HAYCOCK, K. 1973. Ecological studies on Gull Island, Witless Bay, with particular reference to the avifauna. M.Sc. thesis, Memorial Univ. Newfoundland, St. John's.
- HEWSON, J. 1978. Beothuk Vocabularies: A Comparative Study. Newfoundland Museum, St. John's.
- HILL, B. L. 1984. An examination of the relationships between environmental/wildlife attitudes, demographic characteristics and experience in wildlife related outdoor activities. M.Sc. thesis, Memorial Univ. Newfoundland, St. John's.
- HOLT, D. W., J. P. LORTIS, B. J. NIKULA, AND R. C. HUMPHREY. 1986. First record of Common Black-headed Gulls breeding in the United States. Amer. Birds, **40**:204–206.
- HOUSTON, C. S. AND M. J. BECHARD. 1982. Edward Arnold, enthusiastic oologist. Blue Jay, **40**:184–192.
- HOWE, R. H., JR. 1900a. A new subspecies of the genus *Hylocichla*. Auk, **17**:270–271.
- . 1900b. Ranges of *Hylocichla fuscescens*, and *Hylocichla fuscescens salicicola* in North America. Auk, **17**:18–25.
- . 1901. A new race of *Passerculus sandwichensis*. Contrib. No. Amer. Ornith., **1**:1–2.
- . 1902. The Labrador Savannah Sparrow. Auk, **19**:85–86.
- . 1903. A further note on the subspecies of *Passerculus* inhabiting Labrador. Auk, **20**:215–216.
- . 1913. A few notes on Newfoundland birds. Auk, **30**:114–115.
- HOWLEY, J. P. 1876. Geography of Newfoundland. For the Use of Schools. Stanford, London.
- . 1884. The Canada Goose (*Bernicla canadensis*). Auk, **1**:309–313.
- . 1888. Report of Survey across Country from Fortune Bay to Bonavista Bay, by Way of Bay du Nord and Terra Nova Rivers. Robinson's, St. John's.

LITERATURE CITED

- . 1913. Nature studies, with observations on the natural history of Newfoundland. Address to the Daughters of the Empire, 24 February, 32 pp.
- . 1915. The Beothucks or Red Indians. The Aboriginal Inhabitants of Newfoundland. Cambridge Univ. Press, Cambridge, England.
- HUNTINGTON, C. E. 1963. Population dynamics of Leach's Petrel, *Oceanodroma leucorhoa*. Proc. 13th Intern. Ornith. Congr., Ithaca, 1962:701–705.
- HYMAN, R. 1982. Iceland's harvest of plenty. Intern. Wildl., **12**:4–11.
- INDER, J. G. AND D. I. GILLESPIE. 1974. Estimates of the kill of migratory game in the province of Newfoundland 1959–1965: an analysis of small game license returns. Newfoundland Labrador Wildl. Serv. Tech. Rept., **1**:1–46.
- INGERSOLL, E. 1928. Lapwings invade Newfoundland and Canada. Auk, **45**:208–210.
- INGSTAD, H. 1966. Land Under the Pole Star. Cape, London.
- . 1969. Westward to Vinland. St. Martin's, New York.
- INGSTAD, A. S. 1977. The Discovery of a Norse Settlement in America. Universitetsforlaget, Oslo.
- INNIS, H. A. 1940. The Cod Fisheries: The History of an International Economy. Univ. Toronto, Toronto.
- JOHNSON, C. W. 1926. A list of the mollusks collected by Mr. Owen Bryant along the coasts of Labrador, Newfoundland and Nova Scotia. Nautilus, **40**:128–135.
- JOHNSON, R. A. 1940. Present range, migration and abundance of the Atlantic Murre in North America. Bird-Banding, **11**:1–17.
- JORDAN, R. H. AND S. C. OLSON. 1982. First record of the Great Auk (*Pinguinus impennis*) from Labrador. Auk, **99**:167–168.
- JUKES, J. B. 1842. Excursions in and about Newfoundland during the Years 1839 and 1840. Murray, London.
- KELSALL, J. P., E. S. TELFER, AND T. D. WRIGHT. 1977. The effects of fire on the ecology of the boreal forest. Canadian Wildl. Serv. Occas. Paper, no. 32, 58 p.
- KENDALL, W. C. 1911. Report on the fishes collected by Mr. Owen Bryant on a trip to Labrador in the summer of 1908. Proc. U.S. Nat. Mus., **38**:503–510.
- KEVAN, P. G. AND M. COLLINS. 1974. Bees, blueberries, birds and budworm. Osprey, **5**:54–62.
- KING, J. G. AND G. A. SANGER. 1979. Oil vulnerability index for marine oriented birds, p. 227–239. In J. Bartonek and D. N. Nettleship (eds.). Conservation of Marine Birds of Northern North America. U.S. Fish Wildl. Serv., Wildl. Res. Rept. no. 11.

LITERATURE CITED

- KIRKHAM, I. R. AND W. A. MONTEVECCHI. 1982. The breeding birds of Funk Island: an historical perspective. *Amer. Birds*, **36**:111–118.
- KIRKHAM, I. R., P. L. MCLAREN, AND W. A. MONTEVECCHI. 1985. The food habits and distribution of Northern Gannets, *Sula bassanus*, off eastern Newfoundland and Labrador. *Canadian Journ. Zool.*, **63**:181–188.
- KRESS, S. W. 1982. The return of the Atlantic Puffin to Eastern Egg Rock, Maine. *Living Bird. Quart.*, **1**:11–14.
- . 1983. The use of decoys, sound recordings, and gull control for re-establishing a tern colony in Maine. *Colonial Waterbirds*, **6**:185–196.
- KUMLIEN, L. 1879. Contributions to the natural history of arctic America. *Bull. U.S. Nat. Mus.*, no. 15, 179 p.
- LACK, D. 1966. *Population Studies of Birds*. Clarendon Press, Oxford.
- LAIRD, M. L. 1980. *Bibliography of the Natural History of Newfoundland and Labrador*. Academic Press, New York.
- LAMBERTON, R. D. 1976a. Avifaunal Survey of Gros Morne National Park. 3 Vols. Parks Canada Contract Rept. Nos. 74-46.
- . 1976b. An Avifaunal Survey of L'Anse-aux-Meadows National Historic Park. Parks Canada Contract Rept. No. ARO 75-31.
- LATHAM, J. L. 1781–1785. *A General Synopsis of Birds*. 3 Vols. Leigh & Sotheby, London. (Not seen; cited in Lysaght, 1971.)
- . 1821–1828. *A General History of Birds*. 10 Vols. Jacob & Johnson, Winchester, England. (Not seen; cited in McAtee, 1957.)
- LEOPOLD, A. 1966. *A Sand County Almanac*. Oxford Univ. Press, Oxford.
- LEWIS, H. F. AND H. S. PETERS. 1941. Notes of the James Bay region in the autumn of 1940 September 14–October 7. *Canadian Field-Nat.*, **55**:111–117.
- LID, G. 1981. Reproduction of the puffin on Røst in the Lofoten Islands in 1964–1980. *Fauna Norv.*, Ser. C, Cinclus, **4**:30–39.
- LIEN, O. J. AND L. GRIMMER. 1978. Manx Shearwaters nesting in Newfoundland. *Osprey*, **9**:50–54.
- LINDROTH, C. H. 1955. The Carabid beetles of Newfoundland, including the French islands St. Pierre and Miquelon, *Opusc. Entomol.*, suppl. 12, 160 p.
- . 1957. *The Faunal Connections between Europe and North America*. Wiley, New York.
- LIVINGSTON, J. 1981. *The Fallacy of Wildlife Conservation*. McClelland Stewart, Toronto.
- LLOYD, T. G. B. 1875. On the "Beothucks," a tribe of Red Indians supposed to be extinct, which formerly inhabited Newfoundland. *Journ. Anthro. Inst. Britain Ireland*, **4**:21–35.
- LOCK, A. R. 1979. Offshore Labrador Biological Studies (OLABS), Part 2; Report on the 1978 survey of breeding seabirds in Labrador. Canadian Wildl. Serv. Unpubl. Rept. for Total-Eastcan.

LITERATURE CITED

- LOOMIS, E. G. 1945. Notes on birds of northern Newfoundland and Labrador. *Auk*, **62**:234–241.
- LOWE, G. D. AND T. K. PINHEY. 1982. Rural-urban differences in support for environmental protection. *Rural Sociol.*, **47**:114–128.
- LUCAS, F. A. 1888. The Bird Rocks of the Gulf of St. Lawrence in 1887. *Auk*, **5**:129–135.
- . 1890. The expedition to Funk Island with observations upon the history and anatomy of the Great Auk. U.S. Nat. Mus. Rept. 1887–88, p. 493–529.
- . 1903. The Great Auk. *Science*, **17**:311–312.
- LUND, T. A. 1980. *American Wildlife Law*. Univ. California, Berkeley.
- LYSAGHT, A. M. 1959. Some eighteenth century bird paintings in the library of Sir Joseph Banks (1743–1820). *Bull. Brit. Mus. Nat. Hist.*, **1**:251–372.
- . 1971. *Joseph Banks in Newfoundland and Labrador 1766, His Diaries, Manuscripts and Collections*. Faber, London.
- MACARTHUR, R. H. 1972. *Geographical Ecology*. Princeton Univ. Press, Princeton.
- MACCARONE, A. D. AND W. A. MONTEVECCHI. 1981. Predation and caching of seabirds by Red Foxes (*Vulpes vulpes*) on Baccalieu Island, Newfoundland. *Canadian Field-Nat.*, **95**:352–353.
- MACDONALD, D. W. 1976. Food caching by Red Foxes and some other carnivores. *Zeits. Tierpsychol.*, **42**:170–185.
- MACKIE, J. D. 1966. *The Early Tudors 1485–1558*. Clarendon, Oxford. (Not seen; cited in Laird, 1980.)
- MACOUN, J. 1900, 1903, 1904. *Catalogue of Canadian Birds*. Parts I, II, III. Geologic Survey of Canada, Ottawa.
- MACOUN, J. AND J. M. MACOUN. 1909. *Catalogue of Canadian Birds*. Canada Department of Mines, Ottawa.
- MACPHERSON, A. G. 1981. Early perceptions of the Newfoundland environment, p. 1–23. *In* A. G. Macpherson and J. B. Macpherson (eds.), *The Natural Environment of Newfoundland Past and Present*. Memorial Univ. Newfoundland, St. John's.
- MACPHERSON, A. G. AND J. B. MACPHERSON (eds.) 1981. *The Natural Environment of Newfoundland Past and Present*. Memorial Univ. Newfoundland, St. John's.
- MACPHERSON, J. B. 1981. The development of the vegetation of Newfoundland and climatic change during the Holocene, p. 189–217. *In* A. G. Macpherson and J. B. Macpherson (eds.), *The Natural Environment of Newfoundland Past and Present*. Memorial Univ. Newfoundland, St. John's.
- MCTAGGART, J. 1829. *Three Years in Canada . . . 1826–7–8 . . . 2 Vols.* London. (Not seen; cited in McAtee, 1957.)

LITERATURE CITED

- MAHONEY, S. P. 1980. The breeding biology of Common Murres. M.Sc. thesis, Memorial Univ. Newfoundland, St. John's.
- MANNION, J. J. (ed.). 1977. The peopling of Newfoundland. Memorial Univ. Newfoundland Soc. Econ. Paper, no. 8, 289 p.
- MARSHALL, I. 1978. The significance of Beothuk carved pendants. *Canadian Journ. Archaeol.*, **2**:148–152.
- MASON, J. 1620. A Briefe Discourse of the New-found-land. Edinburgh. (Reprinted 1887 by The Prince Society, Boston.)
- MAUNDER, J. E. 1978. Red-throated Loons breeding in Newfoundland. *Osprey*, **9**:49
- . 1982. The Newfoundland Wolf. *Osprey* **13**:36–49.
- MAUNDER, J. E. AND W. A. MONTEVECCHI. 1982. A Field-Checklist (1982) of the Birds of Insular Newfoundland. *Newfoundland Nat. Hist. Soc.*, St. John's.
- MAUNDER, J. E., W. A. MONTEVECCHI, J. WELLS, AND B. MACTAVISH. 1986. Checklist (1986) of the birds of insular Newfoundland. *Osprey*, **17**:192–200.
- MAUNDER, J. E. AND W. THRELFALL. 1972. The breeding biology of the Black-legged Kittiwake in Newfoundland. *Auk*, **89**:789–816.
- MAYR, E. 1946. History of the North American bird fauna. *Wilson Bull.*, **58**:3–41.
- . 1970. *Populations, Species and Evolution*. Harvard Univ. Press, Cambridge, Massachusetts.
- . 1982. *The Growth of Biological Thought*. Harvard Univ. Press, Cambridge, Massachusetts.
- MAYR, E. AND J. C. GREENWAY (eds.). 1960. Check-list of Birds of the World. Vol. 9. *Mus. Comp. Zool.*, Cambridge, Massachusetts.
- MCATEE, W. L. 1957. Folk-names of Canadian birds. *Bull. Nat. Mus. Canada*, no. 149, 74 p.
- MCCOY, J. J. 1970. *Saving Our Wildlife*. MacMillan, New York.
- MCGHEE, R. 1982. Possible Norse–Eskimo contacts in the eastern Arctic, p. 31–40. *In* G. M. Story (ed.), *Early European Settlement and Exploitation Atlantic Canada*. Memorial Univ. Newfoundland, St. John's.
- MCGHEE, R. AND J. A. TUCK. 1975. An Archaic Sequence from the Strait of Belle Isle, Labrador. *Mercury Ser.*, no. 34. *Nat. Mus. Canada*, Ottawa.
- McLAREN, I. A. 1981. The incidence of vagrant landbirds on Nova Scotia islands. *Auk*, **98**:243–257.
- McLAREN, P. L., R. E. HARRIS, AND I. R. KIRKHAM. 1983. Distribution of marine birds in the southern Labrador Sea, April 1981–April 1982. LGL Ltd. Toronto. Unpubl. rept. for Petro Canada Explorations, Ltd., Calgary.
- McNICHOLL, M. 1975. Larid site tenacity and group adherence in relation to habitat. *Auk*, **92**:98–104.
- MEADES, W. J. 1983. Heathlands, p. 267–318. *In* G. R. South (ed.), *Biogeography and Ecology of the Island of Newfoundland*. Junk, The Hague.

LITERATURE CITED

- MERRIAM, C. H. 1883a. Breeding of the Harlequin Duck. Bull. Nuttall Ornith. Club, **8**:220.
- . 1883b. Brief ornithological notes from Newfoundland. Ornith. Oolog., **8**:43.
- . 1883c. The Least Bittern in Newfoundland. Science, **1**:157.
- . 1884. Stearn's natural history of Labrador. Forest and Stream, **22**:184.
- . 1898. Life zones and crop zones of the United States. Bull. U.S. Dept. Agric., no. 10, 79 p.
- MÉTRAS, L. 1984. Migratory birds killed in Canada during the 1982 season. Canadian Wildl. Serv. Prog. Notes, no. 143, 39 p.
- . 1986. Migratory birds killed in Canada during the 1985 season. Canadian Wildl. Serv. Prog. Notes, no. 166, 42 p.
- MILNE, J. 1875. Relics of the Great Auk on Funk Island. The Field, Mar. 27, p. 296.
- MONTEVECCHI, W. A. 1981. In memorium: Leslie Mills Tuck. Auk, **98**:606–609.
- . 1984. Newfoundland and Labrador Natural History Society's Tuck-Walters Natural History Award. Osprey, **15**:80–83.
- . *In press*. Trends in nineteenth century ornithology as exemplified by the research of Peter M. Stuwitz and John Cyrus Cahoon in Newfoundland. In D. S. Steele (ed.), Pre-1900 Science in Newfoundland and Labrador. Sigma Xi Centennial Symposium. Memorial Univ. Newfoundland, St. John's.
- MONTEVECCHI, W. A., R. T. BARRETT, F. RICKARDSSEN, AND K.-B. STRANN. 1987. The population status of gannets in Norway, 1985. Fauna Norv., Ser. C, Cinclus, *in press*.
- MONTEVECCHI, W. A., E. BLUNDON, G. COOMBES, J. PORTER, AND P. RICE. 1978. Northern Fulmar breeding range extended to Baccalieu Island, Newfoundland. Canadian Field-Nat., **92**:80–82.
- MONTEVECCHI, W. A., D. K. CAIRNS, A. E. BURGER, R. D. ELLIOT, AND J. WELLS. 1987. The status of the Common Black-headed Gull (*Larus ridibundus*) in Newfoundland and Labrador. Amer. Birds, **41**: *in press*.
- MONTEVECCHI, W. A., R. I. GOUDIE, AND F. J. PITOCHELLI. 1982. Lake Michel Avifaunal Study and Impact Assessment. Newfoundland & Labrador Hydro Rept., St. John's.
- MONTEVECCHI, W. A., I. R. KIRKHAM, R. PURCHASE, AND B. D. HARVEY. 1980. Colonies of Northern Gannets in Newfoundland. Osprey, **11**: 2–8.
- MONTEVECCHI, W. A., B. MACTAVISH, AND I. R. KIRKHAM. 1981. First North American photographic record of the Redwing (*Turdus iliacus*). Amer. Birds, **35**:147.
- MONTEVECCHI, W. A. AND J. WELLS. 1984a. Fledging success of Northern Gannets from different nest-sites. Bird Behav., **5**:90–95.
- . 1984b. Mainland expansion of the Northern Gannet colony at Cape

LITERATURE CITED

- St. Mary's, Newfoundland. Amer. Birds, **38**:259-262.
- . 1984c. Two new specimen records for insular Newfoundland: Barnacle Goose and Tricolored Heron. Amer. Birds, **38**:257-258.
- MOORE, E. 1841. A collection of birds from Newfoundland. Proc. Zool. Soc. London, **9**:24.
- MOORE, J. P. 1910. The polychaetous annelids dredged in 1908 by Mr. Owen Bryant off the coasts of Labrador, Newfoundland and Nova Scotia. Proc. U.S. Nat. Mus., **37**:137-146.
- MORISON, S. E. 1971. The Northern Voyages, A.D. 500-1600. Oxford Univ. Press, New York.
- MORRIS, R. F. 1983. Introduced terrestrial insects, p. 551-591. In G. R. South (ed.), Biogeography and Ecology of the Island of Newfoundland. Junk, The Hague.
- MORRIS, R. F., W. F. CHESHIRE, C. A. MILLER, AND D. G. MOTT. 1958. The numerical response of avian and mammalian predators during a gradation of the Spruce Budworm. Ecology, **39**:487-494.
- MOWAT, F. 1984. Sea of Slaughter. McClelland Stewart, Toronto.
- MUIR, J. G. 1937. The Game Protection Association, p. 320. In J. R. Smallwood (ed.), The Book of Newfoundland. Vol. 2. Newfoundland Book Publ., St. John's.
- MURRAY, J. M. (ed.) 1968. The Newfoundland Journal of Aaron Thomas 1794. Longmans, Don Mills, Ontario.
- NASH, R. 1967. Wilderness and the American Mind. Yale Univ. Press, New Haven.
- NRCC (NATIONAL RESEARCH COUNCIL OF CANADA). 1975. Fenitrothion: the effects of its use on environmental quality. NRCC, Ottawa.
- NEALE, E. R. W. 1971. Notes on the geology of the island of Newfoundland. Memorial Univ. Newfoundland Geol. Rept., **4**:1-21.
- . 1974. The eighth wonder of the World. Geol., Summer 1974, p. 2-4.
- NELSON, J. B. 1978. The Sulidae: Gannets and Boobies. Oxford Univ. Press, Oxford.
- NETTLESHIP, D. N. 1972. Breeding success of the Common Puffin (*Fratercula arctica*) on different habitats at Great Island, Newfoundland. Ecol. Monogr., **42**:239-268.
- . 1976. Gannets in North America: present numbers and recent population changes. Wilson Bull., **88**:300-313.
- . 1980. Seabird Colonies of Eastern Canada. Canadian Wildl. Serv., Ottawa.
- NETTLESHIP, D. N. AND T. R. BIRKHEAD (eds.). 1985. The Atlantic Alcidae. Academic Press, Orlando.
- NETTLESHIP, D. N. AND P. G. H. EVANS. 1985. Distribution and status of the Atlantic Alcidae, p. 53-154. In D. N. Nettleship and T. R. Birkhead (eds.), The Atlantic Alcidae. Academic Press, Orlando.
- NETTLESHIP, D. N. AND A. R. LOCK. 1973. Observations of fulmars on ledges

LITERATURE CITED

- in Labrador. *Canadian Field-Nat.*, **87**:314.
- NETTLESHIP, D. N. AND R. D. MONTGOMERIE. 1974. The Northern Fulmar, *Fulmarus glacialis*, breeding in Newfoundland. *Amer. Birds*, **28**:16.
- NEWFOUNDLAND WILDERNESS SOCIETY. 1985. Fenitrothion: more research needed. *Evening Telegr.*, 13 April, p. 10.
- NEWTON, A. 1861. Abstract of Mr. J. Wooley's researches in Iceland respecting the Gare-fowl or Great Auk (*Alca impennis*, Linn.). *Ibis*, 1861:374–399.
- NISBET, I. C. T. 1973. Terns in Massachusetts: present numbers and historical changes. *Bird-Banding*, **44**:27–55.
- NOBLE, G. K. 1919. Notes on the avifauna of Newfoundland. *Bull. Mus. Comp. Zool. Harvard*, **62**:543–568.
- NOONAN, M. 1979. Life on Baccalieu. *Newfoundland Quart.*, **75**(Christmas issue):10–12.
- NORDERHAUG, M., E. BRUN, AND G. U. MØLLEN. 1977. Seabird resources of the Barents Sea. R. G. B. Brown (Transl.). *Canadian Wildl. Serv. Transl.*, Dartmouth, Nova Scotia.
- NORDVIK, H. W. AND L. R. FISCHER. 1985. Peter M. Stuwitz and the Newfoundland inshore fishery in 1840. *Newfoundland Studies*, **1**:129–140.
- NORTHCOTT, T. H. 1974. The Land Mammals of Insular Newfoundland. *Newfoundland Wildl. Div.*, St. John's.
- OBERHOLSER, H. C. 1914. Four new birds from Newfoundland. *Proc. Biol. Soc. Washington*, **27**:43–54.
- . 1948. Descriptions of new races of *Geothlypis trichas* (Linnaeus). Priv. Publ., Cleveland, Ohio, 4 pp. (Not seen; cited in Peters and Burleigh, 1951b.)
- . 1974. *The Birds of Texas*. 2 Vols. Univ. Texas Press, Austin.
- OLSON, S. L., C. C. SWIFT, AND C. MOKHIBER. 1979. An attempt to determine the prey of the Great Auk (*Pinguinus impennis*). *Auk*, **96**:790–792.
- OUELLET, H. 1987. Profile of a pioneer: P. A. Taverner. *Amer. Birds*, **41**:20–26.
- PACKARD, A. S. 1891. *The Labrador Coast. A Journal of Two Summer Cruises to that Region*. Hodges, New York.
- PAGE, G., W. C. WILTON, AND T. THOMAS. 1974. *Forestry in Newfoundland*. Canada Forestry Service, St. John's.
- PALMER, W. 1890. Notes on the birds observed during the cruise of the United States Fish Commission Schooner *Grampus* in the summer of 1887. *Proc. U.S. Nat. Mus.*, **13**:219–265.
- PASTORE, R. 1985. Excavations at Boyd's Cove—1984: a preliminary report, p. 322–337. In J. S. Thompson and C. Thompson (eds.), *Archaeology in Newfoundland and Labrador 1984*. Newfoundland Museum, St. John's.
- PEARCE, P. A., G. L. BRUN, AND J. WITTEMAN. 1979a. Off-target fallout of fenitrothion during 1978 forest spraying operations in New Brunswick.

LITERATURE CITED

- Bull. Environm. Contam. Toxicol., **23**:503-508.
- PEARCE, P. A. AND D. B. PEAKALL. 1977. The impact of fenitrothion on bird populations in New Brunswick. Proc. NRCC Sympos., Fenitrothion, p. 299-305.
- PEARCE, P. A., D. B. PEAKALL, AND A. J. ERSKINE. 1979b. Impact on forest birds of the 1976 Spruce Budworm spray operation in New Brunswick. Canadian Wildl. Serv. Prog. Notes, no. 97, 15 p.
- PECKHAM, G. 1583. A True Reporte of the Newfound Landes. London. (Reprinted 1971 by DaCapo Press, Amsterdam, New York)
- PENNANT, T. 1784-87. Arctic Zoology. 2 Vols. Hughs, London. (Not seen; cited in Lysaght, 1971.)
- PEPPER, W. 1945. Bird banding thirty years ago. East. Bird-banding Assoc. News, **8**:5.
- PETERS, H. S. 1942. A new gannet colony in Newfoundland. Auk, **59**:100.
- . 1944. Green-winged Teal, banded in California, taken in Labrador. Bird-Banding, **15**:72.
- PETERS, H. S. AND T. D. BURLEIGH. 1944. Two new records from Newfoundland Labrador. Auk, **61**:472-473.
- . 1945. Some new records from Newfoundland. Auk, **62**:565.
- . 1949. New avian records from Newfoundland. Auk, **66**:172-176.
- . 1951a. Birds of the St. Pierre and Miquelon Islands. Canadian Field-Nat., **65**:170-172.
- . 1951b. The Birds of Newfoundland. Dept. Nat. Resources, St. John's.
- PETERS, S. S. 1967. Our land and sea mammals, p. 317-331. In J. R. Smallwood (ed.), The Book of Newfoundland. Vol. 3. Newfoundland Book Publ., St. John's.
- PETERSON, R. T. 1980. A Field Guide to the Birds East of the Rockies. Houghton Mifflin, Boston.
- PETERSON, R. T., G. MOUNTFORT, AND P. A. D. HOLLOM. 1966. A Field Guide to the Birds of Britain and Europe. Houghton Mifflin, Boston.
- PHILLIPS, A., J. MARSHALL, AND G. MONSON. 1964. The Birds of Arizona. Univ. Arizona, Tucson.
- PHILLIPS, J. C. 1931. Naturalists, nature lovers and sportsmen. Auk, **48**:40-46.
- PIATT, J. 1981. Seabirds in Newfoundland and Labrador. Memorial Univ. Newfoundland and Canadian Wildl. Serv., St. John's.
- . 1984. Net-mortality of marine birds in Newfoundland, 1981-82. Canadian Wildl. Serv. Seabird Res. Unit Rept., no. 163, 63 p.
- POLLETT, F. C. 1967. Certain ecological aspects of selected bogs in Newfoundland. M.Sc. thesis, Memorial Univ. Newfoundland, St. John's.
- PORTER, L. H. 1900. Newfoundland notes. Auk, **17**:71-73.
- PROWSE, D. W. 1895. A History of Newfoundland from the English, Colonial, and Foreign Record. MacMillan, London.
- PULLING, G. C. 1792. The Pulling and Liverpool Manuscripts. Brit. Mus.

LITERATURE CITED

Add. mss 38352. (copy transcribed and edited by J. Hewson in Centre for Newfoundland Studies, Memorial Univ.).

- QUINN, D. B. AND N. M. CHESHIRE. 1972. *The New Found Land of Stephen Parmenius*. Univ. Toronto Press, Toronto.
- RAY, R. B. 1983. Beothuk pendants. *Newfoundland Quart.* **79**:36–38.
- REEKS, H. 1869. Notes on the zoology of Newfoundland, letters 1–4, ornithology. *Zoologist*, **4**:1609–1614, 1689–1695, 1741–1759, 1849–1858.
- . 1870a. Notes on the birds of Newfoundland. *Naturaliste Canadien*, **5**:38–48, 151–159, 289–304, 406–416.
- . 1870b. Notes on the zoology of Newfoundland. *Zoologist*, **5**:2033–2049.
- . 1871. Notes of the zoology of Newfoundland. *Zoologist*, **6**:2340–2357.
- . 1873. *A List of Flowering Plants and Ferns of Newfoundland, with Meteorological Observations*. Blacket & Son, Newbury, England.
- REES, E. I. S. 1965. The fulmar in the western North Atlantic. *Ibis*, **107**:428–429.
- RENDELL, D., ET AL. 1977. Report of the Spruce Budworm review committee. Govt. Newfoundland and Labrador, St. John's.
- RICHARDSON, J. 1979. Survival and early growth of plantations on a drained fen in central Newfoundland. *Newfoundland Forest Res. Ctr. Info. Rept.* N-X-178, 21 p.
- ROBBINS, C. S., B. BRUUN, AND H. S. ZIM. 1966. *Birds of North America*. Golden Press, New York.
- ROGERS, J. D. 1911. *A Historical Geography of the British Empire*. Vol. 5(4). Newfoundland. Claredon, Oxford. (Not seen; cited in Laird, 1980.)
- ROGERSON, R. J. 1981. The tectonic evolution surface morphology of Newfoundland, p. 24–55. *In* A. G. Macpherson and J. B. Macpherson (eds.), *The Natural Environment of Newfoundland Past and Present*. Memorial Univ. Newfoundland, St. John's.
- . 1983. Geological evolution, p. 5–35. *In* G. R. South (ed.), *Biogeography and Ecology of the Island of Newfoundland*. Junk, The Hague.
- ROOKE, K. B. 1935a. Birds, p. 238–261. *In* Clarke, D. (ed.) *Public School Explorers in Newfoundland*. Putnam, London.
- . 1935b. Birds seen in the North Atlantic, August and September, 1934. *Brit. Birds*, **38**:269–275.
- . 1935c. Observations on the birds of Newfoundland during the 1934 expedition of the Public Schools Exploring Society. *Ibis*, **5**:856–879.
- ROWE, F. W. 1977. *Extinction, The Beothuks of Newfoundland*. McGraw-Hill, Toronto.
- ROWE, J. S. 1977. *Forest Regions of Canada*. Supply & Services Canada, Ottawa.
- RUSSELL, F. 1965. *Secret Islands*. Simon & Schuster, New York.

LITERATURE CITED

- SALOMONSEN, F. 1951. The immigration and breeding of the Fieldfare (*Turdus pilaris*) in Greenland. Proc. 10th Intern. Ornith. Congr., Uppsala, 1950:515–526.
- . 1965. The geographic variation of the fulmar (*Fulmarus glacialis*) and the zones of marine environment in the North Atlantic. Auk, **82**:327–355.
- . 1967. The Seabirds of Greenland. (R. G. B. Brown, Transl.). Canadian Wildl. Serv., Dartmouth, Nova Scotia.
- SCLATER, W. A. B. ca. 1920. Unpublished bird notes. Memorial Univ. Newfoundland Archives, St. John's.
- SCAMMELL, A. R. 1940. Songs of a Newfoundlander. J.-H.-A. Labelle, Ltd., St. Jerome, Quebec.
- SEARY, E. R. 1971. Place Names of the Avalon Peninsula of the Island of Newfoundland. Univ. Toronto, Toronto.
- SHAW, H. S. 1940. An early figure of the Great Auk. Auk, **57**:112–113.
- SIMPSON, G. G. 1961. Principles of Animal Taxonomy. Columbia Univ. Press, New York.
- SKLEPKOVYCH, B. O. 1986. The predatory behaviour and impact of Red Foxes (*Vulpes vulpes*) on the seabird colonies of Baccalieu Island, Newfoundland. M.Sc. thesis, Memorial Univ. Newfoundland, St. John's.
- SMALLWOOD, J. R. (ed.) 1937a. The Book of Newfoundland. Vol. 1. Newfoundland Book Publ., St. John's.
- . (ed.) 1937b. The Book of Newfoundland. Vol. 2. Newfoundland Book Publ., St. John's.
- . (ed.) 1967. The Book of Newfoundland. Vol. 3. Newfoundland Book Publ., St. John's.
- SOLMAN, V. E. F. 1981. Federal wildlife conservation work in Canada in the past 100 years. Canadian Field-Nat., **95**:31–34.
- SOUTH, G. R. (ed.). 1983. Biogeography and Ecology of the Island of Newfoundland. Junk, The Hague.
- STEARNS, W. A. 1883. Notes on the natural history of Labrador. Proc. U.S. Nat. Mus., **6**:111–137.
- . 1884. Labrador: A Sketch of Its People and Natural History. Lee & Sheppard, Boston. (Not seen; cited in Story, et al., 1982.)
- . 1890. Bird life in Labrador. Amer. Field (26 Apr.–11 Oct.), p. 1–100.
- STEELE, D. S., J. M. GREENE, AND J. CARTER. 1979. A Biological and Oceanographic Study of the Atlantic Southeast Coast Marine Region. Parks Canada Rept., Ottawa 236 p.
- STEENSTRUP, J. 1855. Et bidrag til Geirfuglens, *Alca impennis* Lin., Natural-historie og saerligt til kundskaben om dens tidligere udbredningskreds. Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjobenhavn. nos. 3–7, p. 33–116.
- STEJNEGER, L. 1873. Norsk Ornitologisk Ekskursjonsfauna . . . Kristiania. (Not seen; cited in Anker, 1938.)

LITERATURE CITED

- . 1884. A new subspecies of willow grouse from Newfoundland. *Auk*, **1**:369.
- . 1885. On the alleged occurrence of the Pacific Eider in Labrador. *Auk*, **2**:386.
- STERLING, K. B. 1977. Last of the Naturalists: The Career of C. Hart Merriam. Arno Press, New York.
- STORY, G. M., KIRWIN, W. J., AND J. D. A. WIDDOWSON. 1982. Dictionary of Newfoundland English. University of Toronto, Toronto.
- STOREY, A., AND J. LIEN. 1985. Establishment of a breeding colony of Manx Shearwaters in Newfoundland. *Auk*, **102**:395–401.
- SWANN, H. K. 1913. A Dictionary of English and Folk-names of British Birds. Witherby, London.
- SWENK, M. H. 1915. The Eskimo Curlew and its disappearance. *Ann. Rept. Smithson. Inst.* 1915, p. 325–340.
- TAVERNER, P. A. 1919. The Birds of Eastern Canada. Dept. Mines, Geol. Survey, Mem. no. 104, Biol. Ser., no. 3, 297 p.
- . 1926. Birds of Western Canada. Victoria Mem. Mus. Bull., no. 41, 380 p.
- . 1938. Birds of Canada. Nat. Mus. Canada, Ottawa.
- . 1940. Preliminary list of the birds of Newfoundland: prepared from records in the National Museum of Canada. Internal Rept. Nat. Mus. Canada, Ottawa, 26 p.
- . 1942. Canadian races of the Great Horned Owl. *Auk*, **59**:234–245.
- TEAL, J. AND M. TEAL. 1969. The Life and Death of the Salt Marsh. Audubon/Ballantine, New York.
- TEMPLETON, W. 1945. Observations of some Newfoundland sea-birds. *Canadian Field-Nat.*, **59**:136–147.
- THRELFALL, W. 1978. Dispersal of Herring Gulls from the Witless Bay Seabird Sanctuary, Newfoundland. *Bird-Banding*, **49**:116–24.
- . 1983. Seabirds, p. 467–508. *In* G. R. South (ed.), Biogeography and Ecology of the Island of Newfoundland. Junk, The Hague.
- TOCQUE, P. 1878. Newfoundland: As It Was and as It Is in 1877. Magurn, Toronto.
- TODD, W. E. C. 1940. Birds of Western Pennsylvania. Univ. Pittsburgh, Pittsburgh.
- . 1963. Birds of the Labrador Peninsula and Adjacent Areas. Univ. Toronto, Toronto.
- TOWNSEND, C. W. 1907. Along the Labrador Coast. Estes, Boston.
- . 1909. Labrador notes. *Auk*, **26**:201.
- . 1911. Captain Cartwright and his Labrador Journal. Estes, Boston.
- . 1913. More Labrador notes. *Auk*, **30**:1–10.
- . 1914. A plea for the conservation of the eider. *Auk*, **31**:14–21.

LITERATURE CITED

- . 1916. A new subspecies of Hudsonian Chickadee from the Labrador Peninsula. *Auk*, **33**:74.
- . 1917. In Audubon's Labrador. *Auk*, **34**:133–145.
- . 1918. In Audubon's Labrador. Houghton Mifflin, Boston.
- . 1919. Notes on Audubon's Labrador trip. *Auk*, **36**:424–426.
- TOWNSEND, C. W. AND G. M. ALLEN. 1907. Birds of Labrador. *Proc. Boston Soc. Nat. Hist.*, **22**:277–428.
- TOWNSEND, C. W. AND A. C. BENT. 1910. Additional notes on the birds of Labrador. *Auk*, **27**:1–18.
- TUCK, J. A. 1975. Ancient People of Port au Choix. Memorial Univ. Newfoundland, St. John's.
- . 1976. Newfoundland and Labrador Prehistory. Van Nostrand Reinhold, Toronto.
- TUCK, L. M. 1947. The Newfoundland Wolf. *The Newfoundlander*, 23 August.
- . 1948. Recent observations on Newfoundland birds in the Argentia–Dunville area. *Canadian Field-Nat.*, **62**:103–112.
- . 1958. Present distribution and population of the Starling in Newfoundland. *Canadian Field-Nat.*, **72**:139–144.
- . 1959. Oil pollution in Newfoundland. *Proc. Intern. Conf. Oil Poll. Sea*, Copenhagen, p. 76–79.
- . 1960. Oil pollution of seabirds in Newfoundland. Newfoundland Ctr., Memorial Univ. Newfoundland, St. John's. Unpubl. ms.
- . 1961. The Murres: their distribution, populations and biology. A study of the genus *Uria*. *Canadian Wildl. Serv. Monogr.*, no. 1, 260 p.
- . 1967a. The birds of Newfoundland, p. 265–284. In J. R. Smallwood (ed.), *The Book of Newfoundland*. Vol. 3. Newfoundland Book Publ., St. John's.
- . 1967b. Field Checklist of the Birds of the Island of Newfoundland. Newfoundland Nat. Hist. Soc., St. John's.
- . 1968. Laughing Gulls (*Larus atricilla*) and Black Skimmers (*Rhynchops nigra*) brought to Newfoundland by hurricane. *Bird-banding*, **39**:200–208.
- . 1971. The occurrence of Greenland and European birds in Newfoundland. *Bird-Banding*, **42**:184–209.
- . 1972. The Snipes: a study of the genus *Capella*. *Canadian Wildl. Serv. Monogr.*, no. 5, 428 p.
- . 1978. The hermit taxidermist of Labrador. *Osprey*, **9**:3–12.
- . 1979. The Newfoundland Wolf. *Newfoundland Quart.*, **75**:21–26.
- TUCK, L. M. AND J. E. MAUNDER. 1975. Field Checklist of the Birds of the Island of Newfoundland. Newfoundland Nat. Hist. Soc., St. John's.
- TURNER, L. M. 1885. List of the birds of Labrador, including Ungava, East Main, Moose and Gulf districts of the Hudson Bay Company, together with the Island of Anticosti. *Proc. U.S. Nat. Mus.*, **8**:233–254.
- VAN FRANEKER, J. A. AND J. WATTEL. 1982. Geographic variation of the

LITERATURE CITED

- fulmar *Fulmarus glacialis* in the North Atlantic. *Ardea*, **70**:31–44.
- VAN TYNE, J. 1948. Eskimo Curlew and Whimbrel collected in Newfoundland Labrador. *Wilson Bull.*, **60**:241.
- WALLIS, W. D. AND R. S. WALLIS. 1955. The Micmac Indians of Eastern Canada. Univ. Minnesota Press, Minneapolis.
- WEBSTER, F. B. 1891. Horrible fate: John C. Cahoon meets death at Newfoundland. *Ornith. Oolog.*, **16**:73–75.
- WELLS, E. D. AND F. C. POLLETT. 1983. Peatlands, p. 207–265. *In* G. R. South (ed.), *Biogeography and Ecology of the Island of Newfoundland*. Junk, The Hague.
- WELLS, J. AND W. A. MONTEVECCHI. 1984. The birds of Baccalieu Island. *Osprey*, **15**:34–40.
- WENDT, S. AND F. G. COOCH. 1984. The kill of murres in Newfoundland in 1977–78, 1978–79 and 1979–80 hunting seasons. *Canadian Wildl. Serv. Prog. Notes*, no. 146, p. 1–9.
- WENDT, S. AND C. HYSLOP. 1980. Migratory birds killed in Canada during the 1979 season. *Canadian Wildl. Serv. Prog. Notes*, no. 115, p. 1–42.
- WHITBOURNE, R. 1622. *A Discourse and Discovery of Newfoundland*. Kynston, London.
- WILSON, J. T. 1966. Did the Atlantic close and re-open? *Nature*, **211**:676–681.
- WILTON, W. C. AND C. H. EVANS. 1974. Newfoundland forest fire history 1619–1960. Newfoundland Forest Res. Cts. Info. Rept. N-X-116, 114 p.
- WINTENBERG, W. J. 1919. Archaeology as an aid to zoology. *Canadian Field-Nat.*, **33**:63–72.
- WITHERBY, H. F. 1928. *The Handbook of British Birds*. Witherby, London.
- WOODWORTH-LYNAS, C. B. 1986. Matacil spraying, p. 21–23. *In* L. W. Coady (ed.), *Fisheries and Oceans Canada Symposium: Fate and Effects of Forest Pesticides (The Newfoundland Experience)*. St. John's.
- WYNNE-EDWARDS, V. C. 1935a. On the habits and distributions of birds in the North Atlantic. *Proc. Boston Soc. Nat. Hist.*, **40**:293–346.
- . 1935b. The Newfoundland gannet colony: with recent information on other North American gannetries. *Ibis* **5**:584–594.
- . 1957. Birds observed at Goose Bay and elsewhere in Labrador. *Canadian Field-Nat.*, **70**:76–77.
- . 1962. *Animal Dispersion in Relation to Social Behaviour*. Oliver & Boyd, Edinburgh.
- YONGE, J. 1663. *The Journal of James Yonge, Plymouth Surgeon*. (Not seen; cited in Story, et al., 1982.)
- YOXALL, W. H. 1981. The surface waters and associated landforms of the island of Newfoundland, p. 154–188. *In* A. G. Macpherson and J. B. Macpherson (eds.), *The Natural Environment of Newfoundland Past and Present*. Memorial Univ. Newfoundland, St. John's.

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